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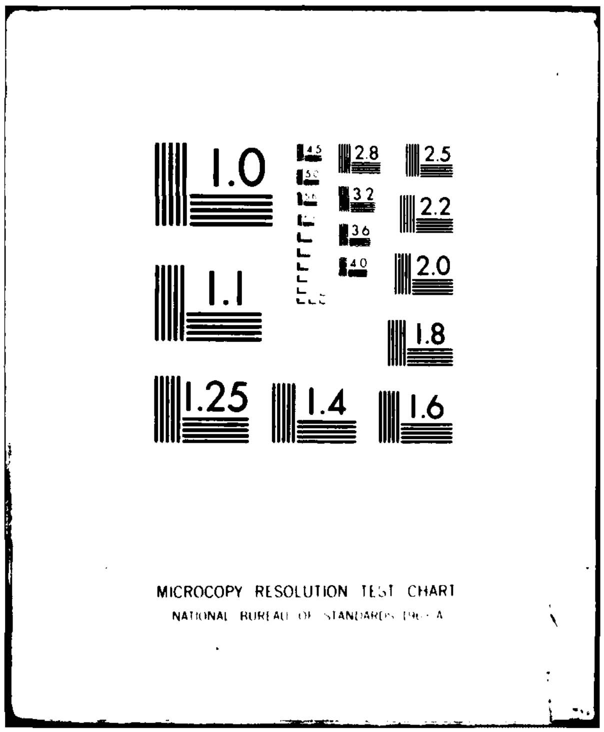
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Airport Landside

Volume II: The Airport Landside Simulation Model (ALSIM) Description and Users Guide

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June 1982
Final Report

U.S. Department of Transportation
Federal Aviation Administration

Office of Systems Engineering and Management
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16. Abstract

This volume provides a general description of the Airport Landside Simulation Model. A summary of simulated passenger and vehicular processing through the landside is presented. Program operating characteristics and assumptions are documented and a complete description of the input data required for simulation operation is furnished. Model outputs necessary for analysis of landside congestion include flow, queue length, queueing time and occupancy. Summaries of values of these parameters, obtained from a simulation run, are shown as examples. Time series of flow and queue length produced during the simulation run are also exhibited.

Other volumes of the Airport Landside report are: Volume I: Planning Guide; Volume III: ALSIM Calibration and Validation; Volume IV: Appendix A ALSIM AUXILIARY and MAIN Programs; and Volume V: Appendix B ALSIM Subroutines.

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PREFACE

This user's guide describes the structure and operation of the Airport Landside Simulation Model (ALSIM). The model was developed under the sponsorship of the Federal Aviation Administration. ALSIM is available to airport owners, operators, and planners to assist in the analysis of landside congestion problems.

This volume provides a general model description and operating instructions. Programming details of the model are contained in the Appendices to this Airport Landside Report. These are entitled: Volume IV: Appendix A ALSIM AUXILIARY and MAIN Programs; and Volume V: ALSIM Subroutines. A general description of airport capacity analysis and the use of a simulation model like ALSIM for landside capacity estimation is contained in Volume I, Planning Guide. Results of calibration and a validation test of the model are contained in Volume III: ALSIM Calibration and Validation.

The authors are indebted to Subash Mahajan, Systems Development Corp. and Robert Walker, Input Output Computer Systems Incorporated for providing documentation assistance and model operation and maintenance. Editorial assistance was provided by Bruce Kingsbury of Raytheon Service Company.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

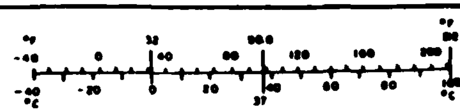

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF ILLUSTRATIONS

LIST OF TABLES

SUMMARY

The Airport Landside Simulation Model (ALSIM) is a computer program used to represent the movement of passengers and vistors between aircraft and the airport boundary. It is designed to produce quantified measures of congestion at essential landside facilities for given demand levels. The measures included are: queue length, waiting time, and occupancy. Concomitant outflow from simulated facilities is also produced. This model is intended to assist planners to identify whether a particular design concept will produce suitable operational characteristics and to estimate effects due to competing concepts. Furthermore, the model may be applied to provide an estimate of overall landside capacity based upon values of levels of service at increasing demand levels.

Because queueing and service processes exhibit similarities for a particular landside facility type, regardless of location, ALSIM contains modules representing generic facilities. These modules are: enplaning curbside, deplaning curbside, ticketing and check-in, security, gate, parking facility exit, bag claim, immigration, customs and car rental. A control section dispatches the simulated passengers to modules based upon input routings. Statistics are maintained individually by the program for each represented facility. Modules are unchanged when the model is applied to different airports.

The input data stream is used to describe characteristics peculiar to the airport under study. Model inputs are grouped into four categories: (1) flight schedule, (2) passenger characteristics, (3) airport geometry, and, (4) facility information. The flight schedule is a list of all arriving and departing flights, including flight time and the number of passengers on each flight. Passenger characteristics designate the percentage preticketed, ground transportation modal choice, well-wishers or greeters per group, bags per passenger and originating passenger arrival times at the airport relative to flight departure time.

The airport geometry and facility information describe location, service time distributions and the numbe of servers or size of the modeled landside processing facilities.

Output statistics are maintained individually by the program for each facility. A summary of the numbers of patrons served, queue length and waiting time averages or distributions are available for all or part of the simulated duration. A time series of facility outflow aggregated over a specified time period is available, as are instantaneous queue lengths and counts of passengers and visitors at landside points.

ALSIM is written in GPSS-V with an extensive FORTRAN supporting subprogram. The GPSS-V program creates transactions to represent passengers and accompanying visitors. These transactions are directed through program blocks which describe the simulated landside processors in a manner closely resembling the routings of passengers through actual processors. The FORTRAN subprogram is used to provide efficiency in matrix searches during program execution and for flexibility in input and output operations with the large data files used by ALSIM.

IBM System 370 Assembly Language subroutines are used to provide program linking, to communicate with GPSS-V transactions and to provide in-core reading and writing capabilities. Because of the language used in these subroutines and the modified use of IBM GPSS-V HELP Block conventions, the model is only usable on IBM systems with the IBM version of GPSS-V

Computer storage and time requirements are dependent upon the number of facilities simulated, the total number of passengers and visitors simulated and an input scale factor which specifies how many passenger groups are simulated by one GPSS-V transaction. For example, using an IBM 370/158, approximately 800 K bytes of storage and 15 minutes of central processor unit time are required to simulate a 100-gate airport with a traffic load of 20,000 passengers over a three-hour period if the scale factor is one. For a scale factor of two, the storage requirement reduces to 500 K bytes and the central processor unit time is approximately 7 minutes.

1.0 INTRODUCTION

The Airport Landside Simulation Model (ALSIM) was developed by the Transportation Systems Center under the sponsorship of the Federal Aviation Administration 09 program. The model is intended for use as a tool to perform landside capacity analysis. The landside extends from the airport boundary to the aircraft gate. This model enacts the movements of originating, terminating and transferring passengers and accompanying visitors through the landside. Quantified measures of congestion including queue length, waiting time, and occupancy are produced for variable demand levels at simulated landside processing facilities. Dynamic changes in these quantities may be observed through use of the model when transient effects due to changes in demand or service capacities are simulated. Furthermore, a level of service indicator such as average waiting time at all facilities may be obtained at specific demand levels and used for determining landside capacity.

Simulation was chosen as the most promising method of analysis of the airport landside because of the time varying nature of demand placed upon the system and the stochastic nature of processes occuring within the system. There is an FAA Airport Landside queueing model applicable to steady state conditions.* However, no analytic queueing model is presently available for application to the landside under these conditions.

The simulation model described here provides estimates of congestion with the above two factors included. The combination of an input time-varying flight schedule, specifying the number of arriving or departing passengers on each flight, plus the use of random numbers to select characteristics and event times for each simulated passenger group provides a model which is time varying and stochastic.

ALSIM is modular in nature, that is, a program section is used to represent a landside processing facility. Input data specifies how many facilities of a given type are present, where they are located, and what service times and numbers of servers are applied.

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* FAA-AVP-78-2

The simulated passenger is provided a routing function, dependent upon requirements, and dispatched from module to succeeding module through a control section. Thus, modules operate independently and may be added or deleted as required.

The model performs the following operations:

- o Generates and routes each simulated originating and terminating passenger group through modeled processing facilities between ground transportation and aircraft.
- o Selects departing flights for each simulated transfer passenger and performs generation and routing to the departure gate.
- o Simulates well-wishers and greeters accompanying and proceeding independently from their respective passenger groups.
- o Represents the above passenger and visitor groups as users of landside processing facilities to model queueing and service processes at enplaning and deplaning curbsides, ticketing and check-in, security, gate, customs, immigration, bag claim, car rental and parking exit facilities.
- o Produces counts of users, waiting time and queue length statistics at each facility and occupancy counts at landside points.

1.1 APPLICATION

The Airport Landside Simulation Model may be applied to at least two distinct planning requirements. The first application is an evaluation of landside capacity. The capacity of a landside facility or set of facilities is defined as the maximum number of patrons processed per unit of time under the condition that a specified level of service parameter value is not exceeded. An acceptable level of service parameter is the average waiting time at the facility or facilities. To perform this type of analysis, the simulation may be operated at a series of demand levels, until

the level of service value is attained. The corresponding flow value is then designated as the capacity.

The second application of ALSIM is an analysis of transient effects at landside facilities due to proposed demand or service modifications. For example, the proposed introduction of several closely spaced wide-body aircraft arrivals into an existing schedule could be examined for congestion effects. Peaking characteristics and the duration of congestion may be investigated. Because the model is stochastic, upper and lower bounds of congestion parameters as a function of time are obtainable.

2.0 GENERAL DESCRIPTION

ALSIM simulates the movements of passengers, visitors, greeters, and well-wishers and the flow of deplaning passengers' baggage in the airport terminal area. The model also simulates vehicle flows at enplaning and deplaning curbsides, on the airport roadway and at parking facilities. ALSIM produces values of flow, waiting time, queue length and occupancy for all simulated facilities. At the completion of a predetermined simulated time period, statistics of these parameters are summarized and presented as output.

A complete list of model inputs is contained in Table 1. Four general categories are used: (1) flight schedule, (2) passenger characteristics, (3) airport geometry, and, (4) facility information. The first two categories describe the demand placed upon the airport landside, and the second two represent the service characteristics of the landside.

The programming language used for ALSIM is GPSS-V with an extensive FORTRAN supporting subprogram. Assembler language is used for special purpose subroutines. GPSS creates and moves transactions representing vehicles and passenger groups through the simulated airport landside. Queueing and service processes are represented and automatically summarized statistical information is produced by the main program. FORTRAN is used to read in the flight schedule, airport geometry, and some passenger characteristic data. The FORTRAN subprogram fills in GPSS matrices with these data, performs matrix searches, and assigns parameter values to GPSS transactions during program execution. This subprogram also produces data reports from GPSS information and produces the time series outputs.

Assembly language subroutines establish program linkages between the GPSS-V main program and the FORTRAN subprogram. They also perform in-core reading and writing, set logic switches, and obtain and assign transaction parameter values for the FORTRAN subprogram.

TABLE 1. ALSIM INPUT DATA

1. <u>FLIGHT SCHEDULE</u>

   Flight Number
   Airline
   Arrival/Departure Time
   Aircraft Type
   Domestic/International/Commuter
   Total Passengers
   Transferring Passengers
   Bag Claim Facility Identification Number

2. <u>PASSENGER CHARACTERISTICS</u>

   Percent Preticketed
   Percent Using Express Check-in
   Passenger Routings on Landside
   Ground Transportation Modal Choice
   Passenger Group Size
   Well-Wishers Per Group
   Greeters Per Group
   Originating Passenger Times of Arrival Distribution Prior to Flight
   Arrival Distribution Greeters
   Arrival Distribution Vehicles Meeting Passengers
   Number of Bags Distribution
   Car Rental Agency Selection Distribution
   Percent of Well-Wishers or Greeters Proceeding to Gate
   Percent of Greeters Proceeding Inside Terminal

3. <u>AIRPORT GEOMETRY</u>

   Point Number
   XY Coordinates
   Facility Type at Point
   Facility Number within Type

4. <u>FACILITY INFORMATION</u>

   Service Time Distributions
   Car/Taxi Loading and Unloading Times
   Number of Servers or Size of Facility
   Baggage Transport Time to Claim Area

The general structure of ALSIM is shown in the block diagram of Figure 1. The major components of the model are; (1) program definitions, containing matrix size specifications, service time distributions, routing functions, and GPSS-V variable definitions, (2) deplaning passenger logic, which creates and assigns routing functions to deplaning passenger and greeter transactions, (3) enplaning passenger logic which creates transactions representing originating passengers and accompanying well-wishers, (4) facility modules representing essential landside processors, (5) the control section for dispatching transactions to facility modules and (6) a timer section to start and stop the simulation process. Part of the enplaning passenger logic is contained in an auxiliary program. This program is operated prior to a simulation run for producing originating passenger transactions which are written on a GPSS-V JOBTAPE file. These transactions enter the main program at times corresponding to originating passenger arrivals at the airport prior to their respective departing flights.

Modules representing airport processing facilities are used because the operations performed by each general type do not differ markedly at major airports. With the exceptions of bag claim and curbsides, most processors are a first in-first out multiserver operation with individual lines or unit queues located at the facility. In the program, the presence or absence of a particular facility at the airport under study may be accommodated by insertion or deletion of the corresponding program module. Each GPSS module has a corresponding FORTRAN program section to calculate movement times between facilities, to search matrices, and obtain the GPSS queue and storage number corresponding to the facility accessed by the GPSS transaction and to assign these numbers to transaction parameters.

2.1 PASSENGER PROCESSING

The enplaning passenger simulation flow is shown in Figure 2. Transactions representing originating passenger groups are generated for each flight included in the input schedule. Para-

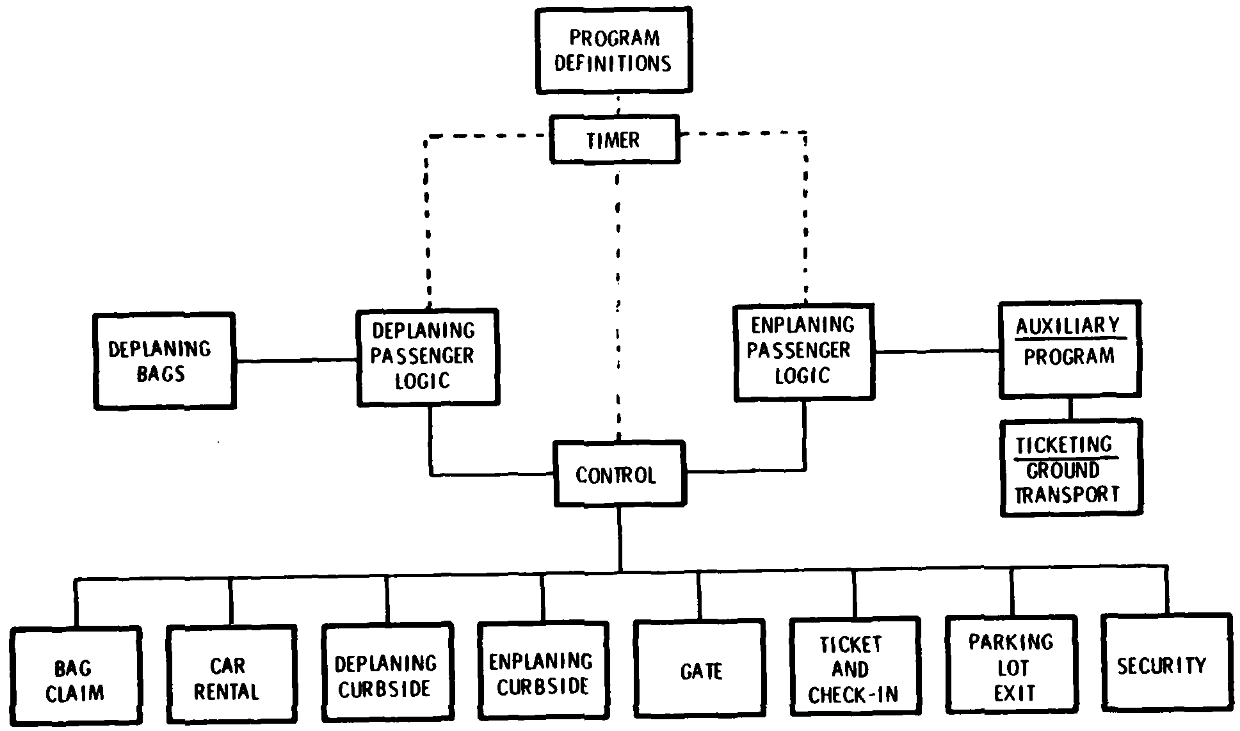

FIGURE 1. AIRPORT LANDSIDE MODEL COMPONENT

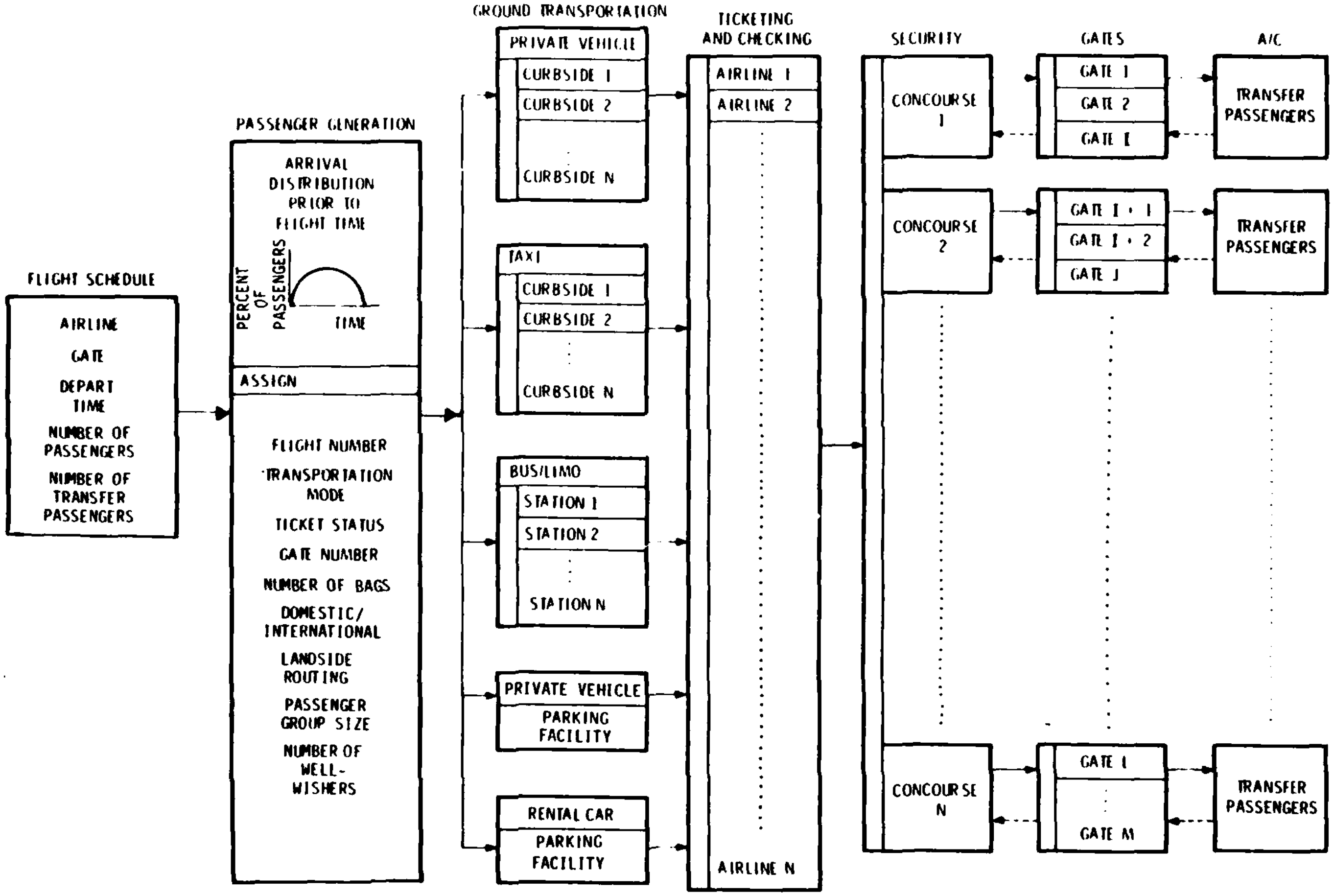

FIGURE 2. ENPLANING PASSENGER FLOW

meters are assigned values to represent passenger characteristics. With the exception of the flight numbers and type (domestic, international, commuter), gate number and landside routing functions the characteristics are assigned using random number generation for each parameter assignment. For example, if 40% was input as the percentage of pre-ticketed passengers, those transactions drawing random numbers between 1 and 400 would be assigned a pre-ticketed status, and those transactions with random numbers from 400 to 1,000 would be designated "non ticketed". Modal choice, number of bags, number of visitors, and passenger group size are selected by this method.

The starting time for an originating passenger transaction to enter the simulation is determined by subtracting a time of arrival at the airport prior to flight from the scheduled departure time. This arrival time is selected from an input distribution by random number generation. The transaction is directed to either the curb, bus station or parking facility module.

Enplaning passenger vehicles approaching the curb are delayed by roadway congestion if double parking or queuing interferes with traffic flow. Vehicles are assigned to curbside sections dependent upon airline.

The simulated vehicle first attempts to obtain a curbside space. If these are filled in the section, a double parking space is sought and, finally, if space is unavailable at either curbside or in double parking space a limited size queue is formed. Those vehicles which are unsuccessful in finding a space in these three locations continue searching at the next curb section. If all specified areas are filled, the vehicle recirculates. Vehicles in double parking or queuing spaces are allowed to remain in these locations for a limited time period, then they are forced to recirculate. When a vehicle departs the curbside or double parking spaces the queue is reduced by one vehicle.

The curbside check-in process is simulated for a percentage of preticketed passengers. A vehicle unloading time is drawn from an input distribution. If well-wishers are to accompany the

passengers into the terminal, the car proceeds to the parking facility. Otherwise, the car remains at the curb for a dwell time, then departs and the outbound roadway count is incremented. The passenger group proceeds into the terminal for processing.

Passengers arriving by taxi use the same curbside as private vehicles. Curb space selection is performed identically. The vehicle is unloaded, then departs. Buses and limousines may proceed to the curb or to a station specified by input separate from the curbside. Rental car passengers proceed to the rental car parking area.

Passengers with baggage are sent to either an express check-in or full-service counter, depending upon ticketed/nonticketed status. A random number draw is used to assign each individual service time as the transaction enters the service storage. If all servers are occupied at a facility, the simulation establishes a queue and maintains statistics of waiting times and queue length. Preticketed passengers without baggage are routed directly to security.

Following check-in, all enplaning passengers enter security. The gate number of the passenger's flight is in a flight table matrix, and the associated security station is assigned. The passenger proceeds from security to the gate where the final processing is simulated. After this step, holdroom counts are incremented until boarding time and then zeroed at flight departure time.

Well-wishers accompanying passengers into the terminal are split off either at security or at the gate. All well-wishers proceed to the terminal exit, then to the parking garage, and depart from the airport landside.

The deplaning passenger simulation is shown in Figure 3. Terminating and transfer passengers are generated by an arriving flight based upon numbers input for each class. Using random number draws, each terminating passenger is assigned a number of bags, ground transportation mode, passenger party size, and the

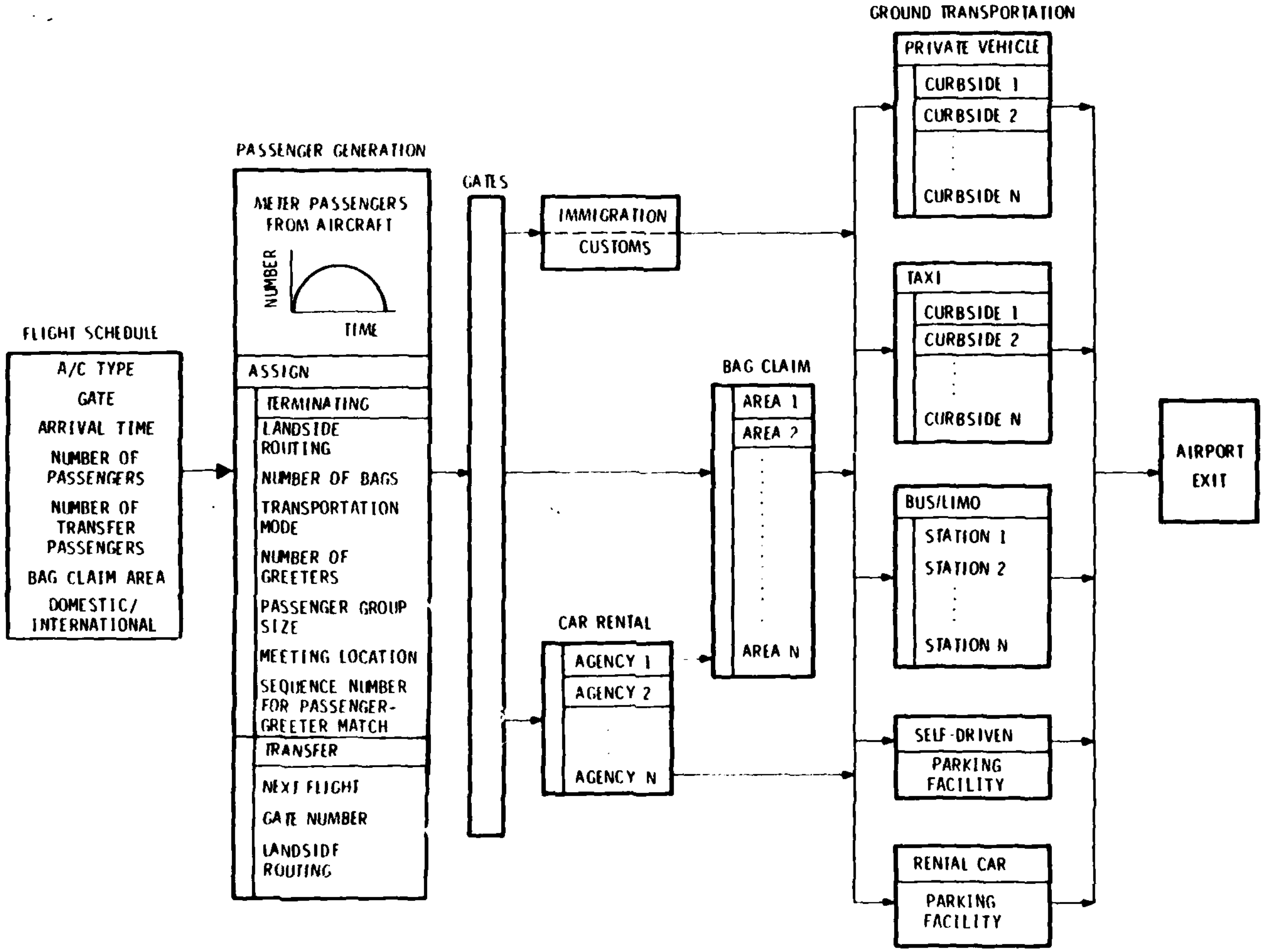

FIGURE 3. DEPLANING PASSENGER FLOW

number of greeters, when applicable. Greeters are also generated and assigned to proceed to the parking facility or curbside and then to the meeting area.

After deplanement, passengers with bags proceed to bag claim. Those designated to be met by greeters at the gate are joined by them. Passengers without bags proceed to the lobby or enplaning curb if they are to be met. The others without bags either proceed to the car rental counter or leave the terminal and go to the garage or taxi and limo stations.

Greeters designated to meet arriving passengers at bag claim are joined with their parties. Waiting times to represent bag arrivals are simulated for each group. Passengers and visitors then proceed out of the terminal to ground transportation facilities.

For international flights, immigration and customs are included in the passenger routings. Service times for passport control and customs bag search are drawn from input distributions.

Transfer passengers randomly choose their next flight from a table of departures which occur between thirty minutes and two hours. Passengers obtaining flights on the same concourse are randomly selected to proceed to the next gate or out to the ticket lobby and concessions based upon input percentages. Transfer passengers with flights on other concourses stop at concessions or ticket counters or proceed directly to the security station and gate. The security and gate processing is the same as other enplaning passengers.

International transfer passengers are processed through immigration and customs. They then proceed to the check-in counter and are thereafter simulated as originating passengers.

The number of greeters entering the terminal is calculated by taking a percentage of those terminating, deplaning passengers designated to be met by private auto. This quantity is further divided into numbers of greeters meeting passengers at the gate, lobby,or bag claim. From these, the greeter group transactions are generated and routing functions to proceed to the meeting

locations are assigned. Group sizes are generated from an input distribution and assigned to a transaction parameter.

A distribution of times of arrival at the airport prior to arriving flight time is used to determine a starting time for the greeter to appear at the landside. Greeters proceed to the parking area or curbside and move through the terminal. The greeters and terminating passenger transactions are matched and the numbers of greeters in the group are absorbed into the passenger transaction. The party then proceeds according to the assigned deplaning passenger routing.

Vehicles without greeters entering the terminal are also generated to meet the terminating passenger at the curbside. Arrival times at the curb are selected from the distribution of arrival times prior to flight.

At the conclusion of the simulation, a statistics report is produced for each of the facilities encountered by enplaning and deplaning passengers. The output items which are of major interest are: total number of persons entering queues, maximum queue sizes, average queue sizes, average time spent waiting in the queues and the distribution densities of waiting times. Other outputs related to the service aspects of the facilities are: total number of patrons served, maximum numbers of agents busy, average numbers of agents busy and average service time per patron. Occupancies and flow values as a function of time are presented.

2.2 MODEL ASSUMPTIONS

The development of ALSIM required simplifying assumptions to restrict the complexity of machine instructions and limit computation time. The model, however, must simultaneously provide sufficient descriptive detail of the landside for accurate simulation of many large airports. The most general model assumptions are the following:

1. Passenger and visitor processing facilities within each type are generally similar and independent of airport type and location. General models can be used to represent all of the members of each facility class.

2. Transfer flight selection, passenger group service times at processing facilities, and bag delivery times are generated by random number selection based upon input distributions, not by a detailed modeling of these processes.

3. Service time distributions are independent of time and server workload. These distributions, however, may differ from one facility to the next within each generic type.

4. At each facility, single queue lines are used to represent multi-server queues. The model represents every individual server at a specific facility and individually selects a service time for each entrant, but the queues are represented as a single line.

5. Passengers and visitors proceed directly from facility to facility. Specific routes through the landside are input for subsequent selection by each individual or group based upon simulated requirements. Any paths requiring deviations to simulate time spent at concessions require input modifications.

6. The model assumes that an exogenous flight schedule will be available to provide a time varying demand on the landside. The schedule must specify flight times and per flight loadings and will ultimately generate all simulated passengers, well-wishers, greeters, private autos and taxis.

7. Each facility operates independently. Arrival rates at simulated facilities are determined by operation of the model. The only predetermined arrivals prior to model

operation are those at the simulation entry nodes. For arriving passengers the entry nodes are the aircraft gates. For departing passengers, well wishers and greeters, model entry nodes are the entrance roadway or the parking facility.

3. OPERATIONAL CHARACTERISTICS

ALSIM is a probabilistic, discrete event, fast time computer simulation model used for producing flow and congestion parameter statistics at simulated landside facilities. Values are randomly drawn from input probability distributions for assigning attributes to simulated passenger groups and specifing service times at facilities. The discrete events occurring within the model are random arrivals and service completions at simulated facilities. Queueing and service statistics are accumulated from these events.

The airport landside model operates in fast time by calculating event durations and advancing the simulation clock to the next imminent event time. Much of the computer time expended by the model is used for scanning chains holding transactions, and moving the active transaction through GPSS program blocks.

The sequence of internal model operations is as follows:

1. A high priority timer transaction is generated to initiate the program.

2. This transaction performs a HELPC call to initiate the linking process with the FORTRAN subprogram FORTM.

3. A HELPA block calling FORTM is next executed.

   a. This completes a linking process allowing two way communication between the GPSS-V program and FORTM at all HELPA blocks.

   b. Mnemonics used in the FORTRAN program are linked with corresponding GPSS entities.

   c. FORTRAN formatted input data is read and placed in GPSS-V matrices.

4. When the AUXILIARY program is operated, a copy of the timer transaction is written on a JOBTAPE file as the first transaction. The initial timer transaction is then held at an ADVANCE block for 10^5 seconds. A

transaction of lower priority is genera*ed to represent all departing flights. Subsequent splits of this transaction first generate transactions representing individual departing flights. These second generation transactions are again split to represent individual originating passenger groups on each departing flight. All passenger transactions are assigned a landside routing function, ground transportation mode, ticketed or non-ticketed status and a number of well wishers. The transactions are stored on a JOBTAPE file according to their time of arrival at the airport landside and read into the MAIN program as simulation time advances. Because originating passengers arrive at the landside according to a distribution of arrival times prior to flight departure which extends up to 140 minutes before flight time, transactions proceeding to later departures are interleaved with those of earlier flight times. A second copy of the timer transaction is written last, then the AUXILIARY program is terminated.

5. When the MAIN program is operated, the timer transaction is advanced to the end of the simulation run as defined by input data. A lower priority transaction is generated to represent all arriving flights. Transactions are subsequently split from this parent, each representing an arriving flight. These arriving flight transactions are held in an inactive status until one hour before their respective scheduled arrival time. As each becomes active, it is split to generate greeters proceeding to the curbside or a parking facility. An airport arrival time distribution relative to the deplaning flight arrival time determines when each of these greeter transactions will enter the simulation process.

   The parent arriving flight transaction is again delayed until scheduled arrival time. At arrival time, terminating and transfer passenger transactions are created. Routing

functions, bag numbers, and ground transportation modes are assigned to each transaction.

6. During the creation of deplaning passenger and greeter transactions, originating passenger transactions proceed to designated landside facilities if their arrival times are sufficiently early. As the simulation clock advances enplaning and deplaning passenger and visitor transactions proceed through the network of landside facilities according to their respectively assigned sequences. Statistics are maintained at each simulated facility for subsequent output. Transactions are terminated as the last step of the routing function.

7. The timer transaction terminates the simulation run at the time designated by input data. Output statistics are produced for analysis.

3.1 MODEL ARCHITECTURE

ALSIM consists of programs written in GPSS-V, FORTRAN and IBM SYSTEM/370 assembly language. Simulation of the landside process is conducted by the GPSS-V MAIN program. The GPSS-V auxiliary program, AUX, is operated prior to MAIN operation for generating transactions representing originating enplaning passengers. These transactions are written on the JOBTAPE file for later entry into the MAIN program. An extensive FORTRAN subprogram, LINKC (FORTM), is called by the GPSS-V programs. During ALSIM initiation, this subprogram reads and organizes input data and stores the values in GPSS matrices and savevalues. During simulation model execution, LINKC (FORTM) is called by the MAIN program to perform matrix searches and assign transaction parameter values each time a landside processor program module is entered. Additional FORTRAN and assembly language subroutines perform linking, data reading, error detection and parameter assignment functions. A block diagram illustrating program levels is shown in Figure 4.

The initial HELPC call from the GPSS MAIN or AUX program is addressed to the FORTRAN subroutine CLINK. This program immed-

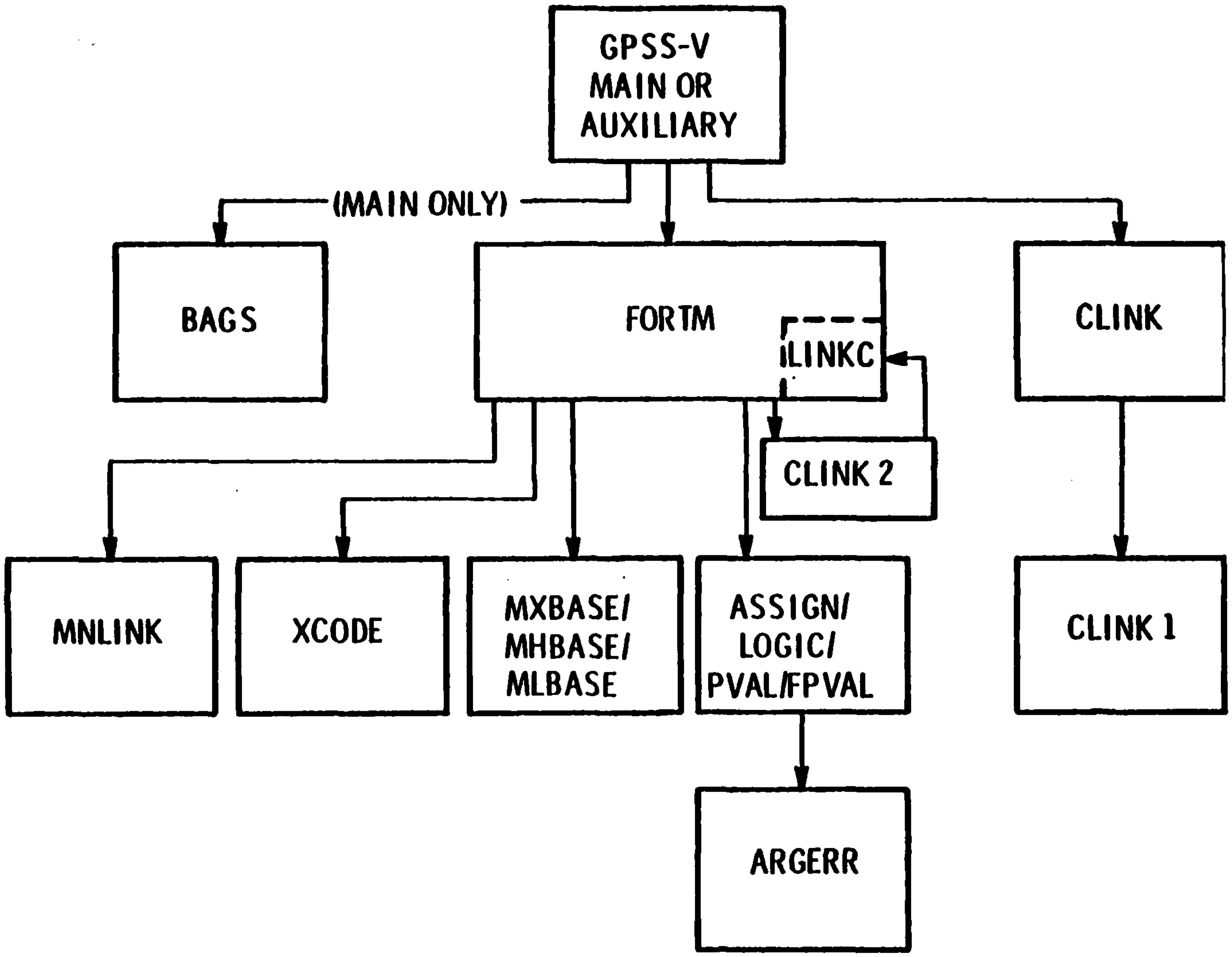

FIGURE 4. ALSIM PROGRAM LEVELS

iately calls CLINK1, which initiates a linking process to subsequently provide addresses of GPSS MAIN or AUX program entities to LINKC(FORTM). The argument list of CLINK designates these entities and is identical to the LINKC(FORTM) argument list. Addresses contained in the list are placed in GPSS fullword savevalue locations by CLINK1. Control is then returned to the AUX or MAIN program.

The subsequent HELPA call is made to the FORTM entry point of LINKC. FORTM subsequently calls CLINK2 which retrieves the CLINK argument list addresses from the GPSS fullword savevalue storage locations and stores them in the LINKC address list location. This process effects a two way communication between FORTM and the MAIN or AUX programs using HELPA blocks by supplying the addresses of GPSS entities to LINKC.

During program initialization, FORTM calls MNLINK to obtain absolute values of GPSS entities, thereby allowing the use of similar or identical mnemonics in each program. FORTM also calls XCODE during this phase to provide in-core reading and writing of input data. The subroutine MXBASE/MHBASE/MLBASE is called to provide base addresses of GPSS matrices for subsequent calculation of element addresses.

The subroutine ASSIGN/LOGIC/PVAL/FPVAL is called repeatedly by FORTM during simulation operation. The multiple functions performed by this subroutine for FORTM are: (1) assignment of parameter values to the currently active transaction; (2) setting of logic switches, and, (3) obtaining the value of GPSS transaction parameters. Errors detected in the calling arguments of this subroutine cause branching to ARGERR where a message is written specifying the problem nature.

Subroutine BAGS is used in the simulation of bag delivery to terminating passengers. It is called from the deplaning logic section of MAIN by each terminating passenger transaction. The transaction is assigned a number of bags from an input distribution. For each simulated bag, this subroutine generates a random number and assigns the highest one generated for the transaction to a transaction parameter. When the actual delivery is later

simulated, the value of the highest random number retained by the transaction determines the length of time spent waiting for bag delivery.

A summary of the functions executed by the ALSIM sections is given below:

a. AUX Program

- Creates passenger transactions for departing flights.
- Prepares a dataset (JOBTAPE) of departing passenger transactions.

b. MAIN Program

- Creates deplaning passenger transactions and assigns attributes: bags per passenger, ground transportation modes.
- Creates transfer passengers and assigns attributes.
- Assigns passenger routing functions.
- Randomly selects service times at simulated facilities from input distributions.
- Generates transactions to represent greeters and well-wishers.
- Simulates baggage claim and baggage unload functions.
- Simulates processing of passengers at the facilities, and accumulates waiting time and queue length statistics.
- Provides summarized standard GPSS outputs.

c. FORTM Subprogram

- Receives inputs: flight information, airport geometry, passenger characteristics, and facilities information.
- Assigns input data to GPSS matrices.
- Performs matrix searches to relate input facility data to GPSS entity numbers.

- o Assigns entity numbers and their location numbers to the GPSS transaction parameters.
- o Computes point to point walking times between the facilities.
- o Formats outputs as summaries and time series.

d. Assembly Language Subroutines

CLINK1 - Initiates linking of GPSS programs and FORTM by storing argument list addresses in GPSS foll-word savevalue area

CLINK2 - Completes linking of GPSS programs and FORTM by retrieving argument list addresses in fullword savevalue area and placing them in LINKC argument list locations.

ASSIGN/LOGIC/PVAL/FPVAL -

- o Performs Parameter Assignments
- o Sets Logic Switches
- o Obtains Transaction Parameter Values

BAGS - Simulates passenger bag delivery

MNLINK - Establishes linkages between GPSS entity names and FORTRAN variable names.

XCODE - Performs reading and writing in Main Storage.

e. Other FORTRAN Subroutines

CLINK - Initiates program linking by calling CLINK1

MHBASE/MLBASE/MXBASE - Computes base addresses for GPSS halfword, floating point and fullword matrices

ARGERR - Prints message when error is detected in arguments of ASSIGN, LOGIC, PVAL or FPVAL

3.2 ALSIM PROGRAM DATA FLOW

The ALSIM program data flow is shown in Figure 5. Input data resides on data cards and on a disc file. The AUX program

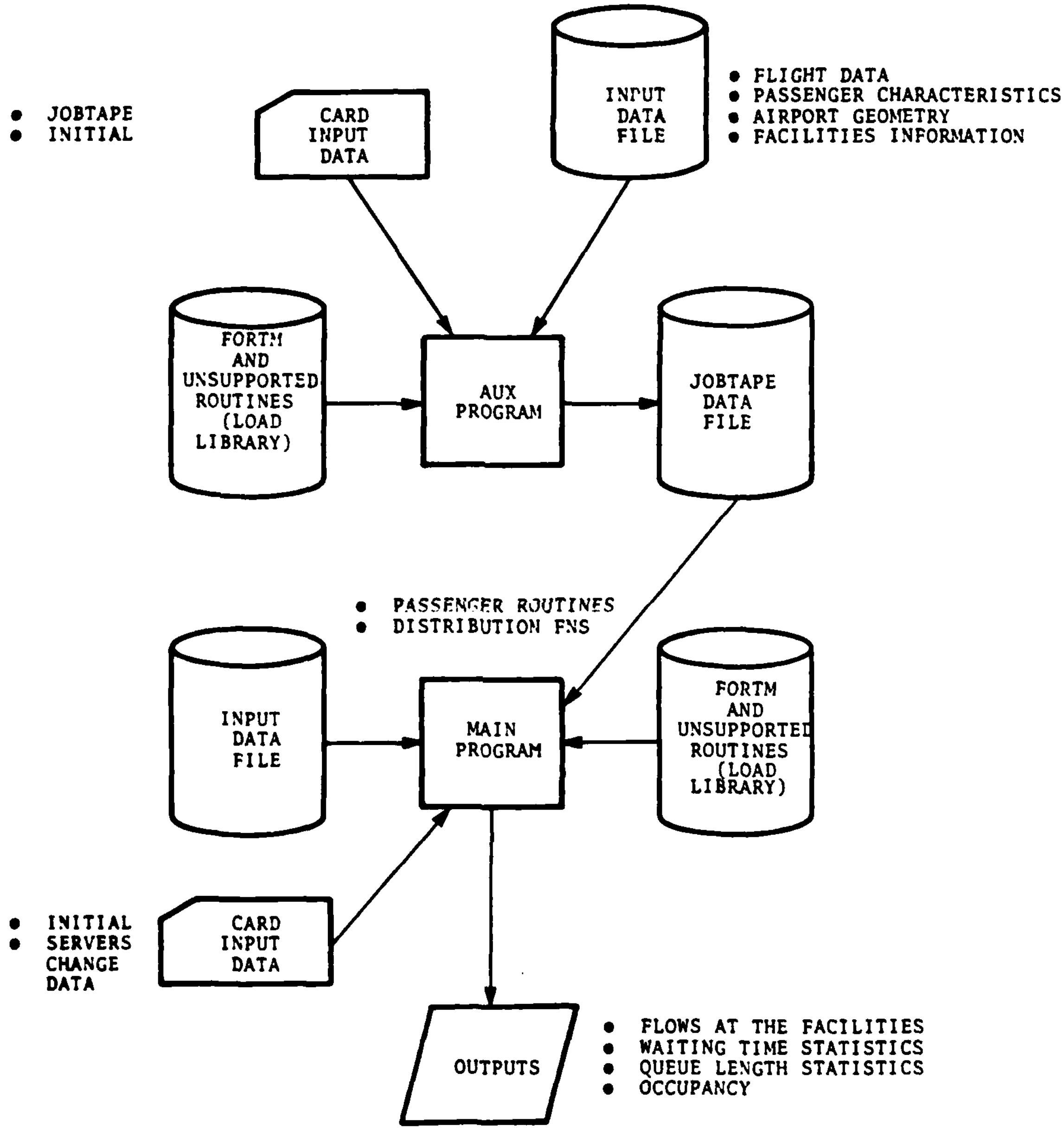

FIGURE 5. ALSIM DATA FLOW SCHEMATIC

must be operated initially to provide a JOBTAPE data file consisting of GPSS transactions representing originating passenger groups. Then the simulation of an airport is performed by operating the MAIN program. JOBTAPE transactions are fed into the main program as simulated time advances to the time of arrival at the airport for each originating passenger group.

The same Input Data File is used for the AUX and MAIN programs, although the AUX program operation only requires part of the stored information. The card data differs, however. A JOBTAPE card is used only during operation of the AUX program to indicate to the FORTRAN subprogram that this program is in operation. An INITIAL card indicates the starting and end times of the simulation and the number of passenger groups represented by one GPSS transaction. the INITIAL card is used by both AUX and MAIN programs. A third card type, specifying the number of servers at a designated facility as a function of time is used by the MAIN program only. Data card formats are described in Section 5 of this volume.

3.3 DESCRIPTION OF ALSIM PROGRAM LIBRARIES

Two libraries are used during the execution of ALSIM. The source library is a partitioned data set containing the source language programs for AUX, MAIN and LINKC(FORTM). These are referenced by the member names AUX, MAIN and FORT, respectively. Approximately 24 tracks of IBM 3350 disk storage are required to accommodate this data set. When the program is executed, the members AUX or MAIN are referenced by GPSS for program assembly.

The load library consists of the compiled program LINKC (FORTM), link edited with the other FORTRAN and assembler subroutines. During model execution, these remain in memory during the entire operation of ALSIM by using the LOAD feature of GPSS-V. The alias name, FORTM, of LINKC is used as the operand in the LOAD block. Approximately 10 tracks of IBM 3350 disk space are required to store this data set.

4. PROGRAM EXECUTION

4.1 JCL FOR THE MODEL

The user does not need an extensive knowledge of Job Control Language (JCL) to run this model. The sample JCL cards needed to run the model are included. This section begins with a brief description of all the cards needed to operate the Landside Simulation Model. Examples of JCL setups for auxiliary and main programs are given in Sections 4.2 and 4.3. Further explanations of GPSS-V JCL may be obtained from the General Purpose Simulation System V-OS Operations Manual (SH20-0867-3), published by IBM.

JOB Card - The parameters on this card are standard ones used on an IBM 370 Computer, except for installation specified accounting and routing numbers contained within parentheses. Both run time and the region size parameters are specified on the JOB card.

EXEC Card - This is a standard card for running a GPSS program. DAG01V is the name of the GPSS V assembler.

STEPLIB Card - The program DAG01V is located in the library SYS1. GPSS5 which is specified on the STEPLIB card. This is concatenated with another library, P. TSC.ALSIM.LOAD, containing the load modules of all the subroutines needed. The modules from this library are loaded in core during the execution of the programs AUX and MAIN. If this library is not cataloged, the Volume and Serial Number of the disk on which it resides, must also be specified.

WORK AREA SPECIFICATION CARDS - DINTERO, DINTWORK, DSYMTAB and DXREFDS cards specify the work areas which are utilized by the programs AUX and MAIN. The space and DCB parameters are assigned on these cards. These cards remain the same for all execution runs. The GPSS report generator input stream is saved in the data set DREPTGEN. This is an optional feature not normally used in ALSIM operation and has been commented out.

OUTPUT and FT09F001 are the printer output files and print the output in a standard 132 characters-per-line format.

FT09F001 DD Card is used to get the error messages and the system dump if the program terminates abnormally. If no dump is needed, DUMMY is specified in the parameter field of this card.

FT12F001 and FT13F001 print five-minute snap-shots of the output. This output is generated in the FORTRAN section of the program. FT14F001 card is used to get the punched output of the five-minute flow rates and queue lengths at specified facilities. This card may be set to DUMMY if no punched output is desired.

DJBTAP1 Card - This card specifies the file - P.TSC.ALSIM.ENPPAX. When the auxiliary program is run, the enplaning passenger transactions are created prior to the departure times of the flights. These transactions are placed in the file P.TSC.ALSIM.ENPPAX and are later used by the MAIN program. The disposition parameter (DISP) is set to OLD on this card.

DINPUT1 Card - This card specifies the GPSS source file for assembly and execution. For the auxiliary program, this card is:

```
//DINPUT1 DD DSN=P.TSC.ALSIM.SOURCE(AUX), DISP=SHR
```

For the main program, this card is:

```
//DINPUT1 DD DSN=P.TSC.ALSIM.SOURCE(MAIN), DISP-SHR
```

FT05001 Card - This card is used to provide a file for FORTRAN input data. When a data set stored on a direct access device is to be used, this data set may be created from card data by using the system utility IEBGENER. The following example illustrates the JCL used to create and catalog the data set P.TSC.ALSIM.DATA on a disk designated PUBLIC.

```
//STEP EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=A
//SYSUT2 DD DSN=P.TSC.ALSIM.DATA,
//     UNIT=PUBLIC,DISP=(,CATLG), SPACE=(TRK, (2,2)),
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=80)
//SYSUT1 DD *
-------------INPUT DATA FOR AIRPORT----------
/*
```

4.2 AUXILIARY PROGRAM RUN

The auxiliary program is run first in order to create passenger transactions for the enplaning passengers. Job Control Language (JCL) to operate AUX is shown below. For this example, the job requires 500K of storage and is run under CLASS=A. Characters contained within parentheses on the JOB Card refer to local accounting and output destination information.

The input data to this program is placed in the file, P.TSC.ALSIM.DATA, which is concatenated with JOBTAPE and INITIAL cards. Server change data is placed on cards after the input data file. The concatenation of data from dissimilar devices, e.g., card reader and direct access device, is not an allowable operation at all installations. The JOBTAPE, INITIAL and SERVER CHANGE data cards may need to be incorporated into the direct access input data file or the entire data file entered by card submission.

```
//JBAUX  JOB (XXXX,D72,DESK),'MAHAJAN',CLASS=A,MSGLEVEL=1,TIME=4,
//   REGION=500K
//* FOLLOWING JCL IS USED TO RUN THE AUXILIARY PROGRAM OF THE LANDSIDE
//* MODEL.
//GPSS EXEC PGM=DAG01V,PARM=A,ACCT=COST
//STEPLIB DD DSN=SYS1,GPSS5,DISP=SHR
//         DD DSN=P.TSC.ALSIM.LOAD,DISP=SHR
//DINTERO DD UNIT=SYSDA,SPACE=(TRK,(10,10)),DCB=BLKSIZE=1880
//DINTWORK DD UNIT=(SYSDA,SEP=(DINTERO)),SPACE=(CYL,(2,1)),
//  DCB=BLKSIZE=2680
//DSYMTAB DD UNIT=SYSDA,SPACE=(TRK,(10,10)),DCB=BLKSIZE=3048
//*DREPTGEN DD UNIT=SYSDA,SPACE=(TRK,(10,10)),DCB=BLKSIZE=800
//DOUTPUT DD SYSOUT=A
//FT06F001 DD SYSOUT=A
//FT09F001 DD DUMMY
//FT12F001  DD  SYSOUT=A,DCB=(RECFM=UA,BLKSIZE=133)
//FT13F001  DD  SYSOUT=A,DCB=(RECFM=UA,BLKSIZE=133)
//FT14F001  DD  SYSOUT=B,DCB=(RECFM=UA,BLKSIZE=133),DEST=LOCAL
//SYSUDUMP DD DUMMY
//DJBTAP1 DD DSN=P.TSC.ALSIM.ENPPAX,DISP=SHR
//DINPUT1  DD  DSN=P.TSC.ALSIM.SOURCE(AUX),DISP=SHR
//FT05F001  DD  *
JOBTAPE
INITIAL   DATA   CARD
//        DD  DSN=P.TSC.ALSIM.DATA,UNIT=PUBLIC,DISP=OLD,
        DCB=(RECFM=FB,LRECL=80,BLKSIZE=80)
         ----- S E R V E R S  C H A N G E  D A T A  C A R D S ----
/*
```

4.3 MAIN PROGRAM RUN

This program is operated after the successful run of the auxiliary program. The input data stream is same as used by the program AUX except that the JOBTAPE Card is not used by this program. For this example, the job requires 500K of storage and is run under CLASS=A. The JCL needed to run this step is given as follows:

```
//JBMAIN JOB (XXXX,D72,DESK),'MAHAJAN',CLASS=A,MSGLEVEL=1,TIME=4,
//   REGION=500K
//* FOLLOWING JCL IS USED TO RUN THE MAIN PROGRAM OF THE LANDSIDE MODEL.
//GPSS EXEC PGM=DAG01V,PARM=A,ACCT=COST
//STEPLIB DD DSN-SYS1.GPSS5,DISP=SHR
//        DD DSN=P.TSC.ALSIM.LOAD,DISP=SHR
//DINTERO DD UNIT=SYSDA,SPACE=(TRK,(10,10)),DCB=BLKSIZE=1880
//DINTWORK DD UNIT=(SYSDA,SEP=(DINTERO)),SPACE=(CYL,(2,1)),
//  DCB=BLKSIZE=2680
//DSYMTAB DD UNIT=SYSDA,SPACE=(TRK,(10,10)),DCB=BLKSIZE=3048
//*DREPTGEN DD UNIT=SYSDA,SPACE=(TRK,(10,10)),DCB=BLKSIZE=800
//DXREFDS  DD UNIT=SYSDA,SPACE=(TRK,(1,1)),DCB=BLKSIZE=2680
//DOUTPUT DD SYSOUT=A
//FT06F001 DD SYSOUT=A
//FT09F001 DD DUMMY
//FT12F001  DD  SYSOUT=A,DCB=(RECFM=UA,BLKSIZE=133)
//FT13F001  DD  SYSOUT=A,DCB=(RECFM=UA,BLKSIZE=133)
//FT14F001  DD  SYSOUT=B,DCB=(RECFM=UA,BLKSIZE=133),DEST=LOCAL
//SYSUDUMP DD DUMMY
//DJBTAP1 DD DSN=P.TSC.ALSIM.ENPPAX,DISP=SHR
//DINPUT1  DD  DSN=P.TSC.ALSIM.SOURCE(MAIN),DISP-SHR
//FT05F001  DD  *
INITIAL   DATA   CARD
//       DD  DSN=P.TSC.ALSIM.DATA,UNIT=PUBLIC,DISP=OLD,
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=80)
         ---- S E R V E R S  C H A N G E  D A T A  C A R D S ----

/*
```

5. ALSIM INPUT DATA

The model input data consists of flight schedules, passenger characteristics, airport geometry and the facility information. Data items for each of these categories are shown in Table 1.

The data description in this chapter is divided into two parts. Section 5.1 describes the FORTRAN inputs, and Section 5.2 presents the GPSS data.

5.1 FORTRAN INPUT DATA DESCRIPTION

A brief description of the ALSIM data entered through the subprogram FORTM is contained in this section. These records are initially read as character data and subsequently reread in-core through NAMELIST statements. Card identifiers of each data type are underlined in the text. These names must begin in column one and are followed by one or more succeeding blanks used as a delimiter. Data items may be placed in any order on the record and are delimited by a comma. All of the 80 record columns are available for the identifier plus data. Blanks embedded in data may only appear between a comma and the beginning of a succeeding keyboard name. With the exception of JOBTAPE and INITIAL cards which are placed at the beginning of the data set, and the CHANGE cards, which are last, data cards may be submitted in any order.

Except for the WALKSP and DSTFAC parameters written on the INITIAL card, all numerical entries are unsigned integer constants. Most of the program variables are fullword integers. However, those entries used to specify the X, Y coordinates are halfwords to reduce memory space. The WALKSP and DSTFAC parameters are entered as real constants.

5.1.1 JOBTAPE Card

The JOBTAPE card is the first card in the data stream. This card is used only when the auxiliary program is run. For the

MAIN program execution, this card is not used. This card contains only the word JOBTAPE starting in column 1.

5.1.2 INITIAL Card

This is the first card for the main program run and the second card for the auxiliary program. The following parameters are specified on this cars.

START = XXXX	Starting time of the simulation, this must be at least 150 minutes before the first departing flight time.
FINISH = YYYY	Time when the simulation ends
DEFLIN = m	m is the default airline number. If airline number is not specified on flight data cards, m is assumed.
DEFBAG = n	n is the default baggage claim area number.
SCALE = p	p is the number of passenger groups represented by one transaction in the model run
WALKSP = q	Walking speed, default: 1.0 meter/sec.
DSTFAC = r	Distance multiplier to account for non-straight line distance between an, two points. default: 1.1 meters

5.1.3 RUNTITLE Card

A maximum of 5 cards may be used to provide information identifying a simulation run. These may indicate the airport simulated, the intent of the simulation and other pertinent data. This information will be printed out as a header for FORTRAN formatted output.

5.1.4 *(COMMENT) Cards

An unlimited number of comment cards may be submitted in any location in the data set by placing an asterisk in the first card column.

5.1.5 GRTRANSP Card

One or more of the GRTRANSP cards may be needed depending upon the type of flights being simulated. This card specifies the percentages of the passengers utilizing various modes of ground transportation. Omitting any mode, defaults that mode to 0%.

DOM/COM/INT	=1 (Required) specifies the type of passenger (Domestic, commuter or International) to which those percentages apply.
PVTCAR = m	-Percentage probability that a passenger will take the private car as a ground transport mode.
CRENT = p	p is the probability that the passenger uses a rental car.
TAXI = q	q is the probability that passenger takes a taxi.
BUS = r	r is the probability that the passenger takes a bus as a ground transport mode.

5.1.6 %PRETICKETED Card

This card specifies the percentage of domestic preticketed and domestic direct preticketed passengers. Percent preticketed values for commuter and international flights can also be specified in a similar manner.

DOM = m	m is the percentage of the domestic passengers who are preticketed.
DOMDIR = n	n is the percentage of the total domestic passengers who go directly from the terminal entrance to security and are preticketed.

For commuter airlines, the variables will be COM and COMDIR, and the variables for international airlines will be INT and INTDIR.

All variables must appear on the same card.

5.1.7 AIRLINE Cards

Airline cards identify the airline numbers. The following parameters are used on these cards:

LINES = n — n is the airline number.

EPCURB = m — m is the enplaning curb number. Specified for the airline n.

EXPCHK = p — p is the percentage of passengers using this airline and using express check-in. This parameter is required for airlines having express checking facilities.

BUSTOP = k — Required if bus/limousine service is to be simulated. It is the enplaning curb facility number where the passengers arriving by bus or limousine disembark for the entry into the terminal building.

5.1.8 BUS/LIMO Card

ARVBUS — Time interval between arriving buses at the enplaning curb.

DEPBUS — Time interval between departing buses at the deplaning curb.

5.1.9 PARM Card

The variables defined on PARM cards are as follows:

CURBCK = r — The percentage of total passengers using the curbside check-in.

BOARDT = s — This is the time all passengers take to board the aircraft.

ERRORS = t — Maximum number of FORTRAN errors allowed during the program execution.

LEAVEL — The minimum time before a flight that a passenger at a lobby concession will leave it and rejoin the normal traffic flow (in minutes). Default = 15 min.

LEAVEC — The minimum time before a flight that a passenger at a concourse concession will leave it (in minutes). Default = 10 min.

LEAVEV — The "variation" in the above times prior to the minimum (in minutes); i.e., the width of the uniform distribution of leave times Default = 10 min.

GREET — The percentage of passengers with greeters.

WWGATE — The percentage of passengers with well-wishers whose well-wishers accompany them to the gate. Default = 0.

GRGATE	The percentage of passengers with greeters whose greeters meet them at the gate. Default = 0.
CIRCPK	The percentage of recirculating greeters who choose to park and go inside to meet their passengers. Default = 0.
CRBGT	The percentage of passengers with greeters who are met at curbside. Default = 0.
PRKCRB	The percentage of parking greeters proceeding from parking exit to curbside for passenger pickup. Default = 0.

If the PARM variables exceed the record size a second PARM card may be used.

5.1.10 ARRV and DEPT Cards

(Flight data cards): These cards describe the arriving and departing flights and assign various parameters to them. A list of the parameters is given as follows:

FLTNO = j	j is the flight number. This parameter is optional and is used for identification purposes only.
AIRLIN = K	This is required for departing flights if DEFLIN is not specified on INITIAL card. This is used to match passenger transactions with the TICKETING/CHECKING facilities of the appropriate airlines.
TIME = nnnn	Required. This is the scheduled arrival or departure time.
AC = nnn	Required for ARRV flghts only. Default = 0. AC = Aircraft Type. This is used to specify unloading gates for the passengers and baggage as a function of aircraft type.
PAX = m	m is the total number of deplaning or enplaning passengers on the flight.
BAG = n	Required for arriving flights only if DEFBAG is not specified on INITIAL card. The baggage claim facility number, n, is used by the arriving flight.
GATE = p	Gate number p is required for both arriving and departing flights.
TPAX = q,r.s	Optional. Defaults to zero. q - passengers transferring to/from another flight.

	r - number of transit passengers who deplane and then return to the same aircraft.
	s - number of transfer passengers who go to or come from locations outside the system simulated (e.g., other parts of the airport while simulating concourse).
DOM/INT/COM	1 - Optional, default: DOM = 1 DOM = 1 Domestic Flight INT = 1 International Flight COM = 1 Commuter Flight Permits different number of bags, ground transport, modes, etc., to be specified for passengers from different types of flights.

5.1.11 TRANSFER Cards

Transfer cards define the time in minutes prior to departure when a departing flight will be considered a transfer flight for passengers on arriving flights. This card is optional because the model uses default values which are overridden by using this card.

ADD	= n - optional - Default = 120 minutes. This is time in minutes prior to the departure when the flight will be entered in the transfer flight table matrix MH5.
DELETE	= m - Optional - Default = 30 minutes. This is the time in minutes prior to departure when the flight will be deleted from the transfer flight table.

5.1.12 OVERRIDE Cards

These cards are optional and are used to enter walking times or distances between the points. This may be needed for those cases where the walking time will differ significantly from the time calculated by the program. One card is required for each point to point override.

FROM = n1, TO = n2 or FROMTO = n1, n2	Either form is acceptable. This card overrides the walking time between points n1 or n2.
DIST = m1 or TIME = m2	Either form is acceptable. The walking time (in seconds) or distance between points n1 and n2.

The default values of walking time between any two facilities are computed from the fixed speed, 1 meter/second, by using the shortest distance paths.

5.1.13 CHANGE Cards

This card is provided for changing the number of servers at a facility during a simulation run. The variables appearing on this card are as follows:

TIME = hhmm. Clock time at which the change is to be made.

SERVRS = 'name', facno, servers, facno, servers, etc.
'Name' is the four-character facility type name (same as the first four characters of the geometry card). Valid facility types are 'GATE', 'CHEC', 'SECU', 'CUST', 'ENPL', 'PARK', 'RENT', 'DEPL', 'IMMI', 'TICK'. After the facility type, as many pairs as desired of facility numbers and new numbers of servers can be specified. A new facility type can then be given, followed by more facility numbers and servers. The only limitation is the length of a card; however, more than one change card can specify changes at a given time.

All CHANGE cards must be in chronological order and placed at the end of the input deck. A sample CHANGE card is given as follows:

```
CHANGE TIME =1350,SERVRS='TICK',1,7,5,3,'SECU,4,2,
```

The above card indicates that at TIME=1350 there will be 7 servers at the ticketing and checking facility number 1, and 3 at the facility number 5. There will also be 2 servers at security facility number 4.

The CHANGE cards must be placed at the end of the FORTRAN input data set.

5.1.14 Facility Data Cards

These cards specify information required to simulate airport landside facilities. For each facility, these cards specify location, size or number of servers, and information relating this facility to other facilities. Each facility type is identified by name which appears as the first keyword parameter.

Each facility is located at a specified point number (POINT) on the landside. The X,Y coordinates of the point expressed in meters are specified by the keywords POINTX=n1, POINTY=n2, or the dyadic symbol XY=n1,n2. Although the point number must appear on every facility card, coordinates of each point require only one specification in the input data set and repetition of X,Y values is unnecessary.

The facility number parameter (FACNO), specifies the number of the designated facility within type. A maximum of four colocated facilities of the same type may be specified on a single card. Input parameters other than facility numbers and respective numbers of agents or servers must be applicable to all facilities numbered on the data card.

The model will determine the nearest exit point (EXITPT) and entrance point (ENTRPT) for each facility. These points may be overridden by assigning values to the EXITPT and ENTRPT parameters on the facility cards.

5.1.14.1 GATE Cards - The gate facility card specifies the facility number (FACNO), point number (POINT), XY coordinates of the point location (XY), number of agents (AGENTS) and a security facility number (NSECUR) used by passengers to proceed to the facility. For gates handling international flights, the immigration facility number (NIMMI) used by the deplaning passengers is also specified. An example is shown below:

GATE FACNO=6,7,8,POINT=16,XY=3297,2930,NSECUR=1,AGENTS=2,1,3,

This card specifies three gate facilities located at point number 16. They are accessed via security facility number one. Two servers operate at gate six, one at gate seven and three at gate eight.

5.1.14.2 DEPLCURB and ENPLCURB Cards - Both deplaning curbside (DEPLCURB) and enplaning curbside (ENPLCURB) have similar data. Each facility card contains facility number (FACNO), point number (POINT), XY co-ordinates (XY), facility size (SIZE). The parameter,

SIZE, refers to the number of curbside parking slots. Two optional parameters can also be specified: DPARK, refers to the number of double parking slots, and CURBQ, specifies the number of queue slots. A sample example is shown below. In this example DPARK is 2, and CURBQ is 6.

```
DEPLCURB FACNO=3,POINT=79,XY=3118,3103,SIZE=20,DPARK=2,CURBQ=6
```

5.1.14.3 <u>RENTACAR Cards</u> - On a car rental facility card (RENTACAR), the parameters facility number (FACNO), a point number (POINT), XY co-ordinates (XY),and number of agents (AGENTS) are similar to those of other facility cards. Two additional parameters, rental car agency number (AGENCY) and parking lot number for rental cars (NPARKL) are also specified on this card. A sample example is shown below:

```
RENTACAR FACNO=2,POINT=67,XY=3106,3317,AGENCY=2,AGENTS=2,
NPARKL=1,                        .........(All on one card)
```

5.1.14.4 <u>SECURITY Card</u> - This card has a unique facility number (FACNO), point number (POINT), X-Y co-ordinates (XY) and number of agents (AGENTS). A sample example is shown below:

```
SECURITY FACNO=5,POINT=51,XY=2893,3875,AGENTS=2,
```

5.1.14.5 <u>BAGCLAIM Card</u> - Each baggage claim facility card contains the parameters: facility number (FACNO), X-Y co-ordinates (XY) and the number of deplaning curb (NDEPLC) to which the arriving passengers go. A sample example is shown below:

```
BAGCLAIM FACNO=8,POINT=65,XY=2856,3932,NDEPLC=3,
```

5.1.14.6 <u>PARKING Card</u> - This card has the parameters: Facility number (FACNO), point number (POINT), X-Y co-ordinates (XY),and number of agents (AGENTS). A sample example is shown below:

```
PARKING FACNO=3,POINT=70,XY=2743,3780,AGENTS=2,
```

5.1.14.7 CONCESSION Card - This card is used to specify a lobby or concourse concession. For those concessions located in the lobby, the facility number (FACNO), point number (POINT) and X,Y coordinates (XY) are used. When a concourse concession is specified, the above three parameters are coded and the security facility number (NSECUR) identifying the concourse is also specified. A sample CONCESSION card is given as follows:

CONCESSION FACNO=1,POINT=60,XY=3368,3024, NSECUR=1,

This example designates a concession located on concourse number one.

5.1.14.8 CUSTOMS Card - This card is needed if the simulation is handling international passengers. Customs card also requires FACNO, POINT and XY parameters. The parameter, AGENTS, specifies the number of servers, and the parameter, NDEPLC, specifies the number of depaning curb to which the international passengers go after they have cleared through customs. A sample example of CUSTOMS card is given as follows:

CUSTOMS FACNO=1,POINT=40,XY=3145,3375, AGENTS=10,NDEPLC=3,

5.1.14.9 IMMIGRATION Card - This facility card is also used for international passengers and uses the standard parameters: FACNO, POINT, XY, and AGENTS. An additional parameter, NCUST, specifies the number of customs facility to which the arriving passengers go after clearing through immigration. A sample example follows:

IMMIGRATION FACNO=1,POINT=42,XY=3146,3030,AGENTS=5,NCUST=1,

5.1.14.10 ENTRANCE/EXIT Card - These specify the location of airport terminal building entrances and exits. Because entrance and exit doorways are generally placed side-by-side, either an ENTRANCE or an EXIT card is used to indicate a facility capable of permitting passage in either direction. When one way flow requires specification, the parameter TWOWAY is set to NO(TWOWAY=NO) and applied to either an ENTRANCE

or EXIT card. A sample ENTRANCE card is shown below:

EXTRANCE FACNO=2,POINT=75,XY=2935,3254,

The above example eliminates the need of specifying a separate EXIT card because the program assumes adjoining entrance and exit facilities.

5.1.14.11 TICKETS&CHECKIN Cards - This card is used to represent full service ticketing and check-in facilities operated by airlines in the terminal building Parameters used for this card are: Facility number (FACNO),X-Y coordinates (XY), point number (POINT), airline number (AIRLIN) and number of agents (AGENTS). An example of a TICKETS&CHECKIN card is shown below:

TICKETS&CHECKIN FACNO=4,XY=3154,2846,POINT=4,AIRLIN=11,AGENTS=3,

5.1.14.12 CHECKIN Cards - Express check-in facilities, operated by airlines to check baggage for preticketed enplaning passengers are designated by CHECKIN cards. The parameters used for this facility are: facility number (FACNO), number of servers (AGENTS), point number (POINT) airline number (AIRLIN) and X,Y coordinates (XY). A sample of this card type is shown below:

CHECKIN FACNO=11.POINT=12,AIRLIN=1,AGENTS=10,XY=3114,3222,

5.1.15 TIMESERIES Cards

These cards are used to specify the absolute values of GPSS storages, queues and halfwords for the purpose of obtaining flow and instantaneous queue length output data produced as timeseries. The flow data consists of the number of persons or vehicles discharged by a facility during a specified time interval. This data is obtained from GPSS storage entry counts during the time interval minus current contents or from GPSS halfwords used as flow counters. Storage information is used if each transaction represents only one person or vehicle multiplied by the scale factor. When one transaction represents a group larger than one passenger

multiplied by the scale factor, GPSS halfwords are used to count flow. Queue lengths are obtainable directly from a QUEUE block regardless of group size represented by the transaction.

Absolute values of entities used by the GPSS-V MAIN program may be specified by the EQU statements discussed in the next section. These TIMESERIES cards designate the absolute values of the storages (GPSTO), queues (GPQUE) and halfwords (GPHALF) selected for output. Up to 24 entities of each type may be submitted. Two entity types may appear on one card. However, the keywords may not be repeated on a second card.

Examples of this type of input card are shown for each of the three entity types:

```
TIMESERIES GPSTO=23,22,19,
TIMESERIES GPQUE=23,28,186,188,191,35,36,37,
TIMESERIES GPHALF=33,28,24,20,111,115,116,117,
```

For this example the storage and queue 23 have an identical absolute value.

5.2 INPUT DATA FOR MIAMI

```
*
*
RUNTITLE                MIAMI INTERNATIONAL AIRPORT
RUNTITLE                   CONCOURSE A TO H (ALL)
RUNTITLE                          SCALED
RUNTITLE                     MODEL DATA 03/18/1978
*
*   A I R L I N E S    N A M E S
*
* AIRLINE 1  EASTERN
* AIRLINE 2  DELTA
* AIRLINE 3  NATIONAL
* AIRLINE 4  BRANIFF
* AIRLINE 5  SOUTHERN
* AIRLINE 6  NORTHWEST
* AIRLINE 7  UNITED
* AIRLINE 8  CONTINENTAL
* AIRLINE 9  AIR CANADA,AIR JAMAICA
* AIRLINE 10 PAN AM
* AIRLINE 11 TWA
* AIRLINE 12 BRITISH AIRWAY & MEXICANA
*            AERO CONDOR
*            VIASA,BELIZE
*            DOMINICIANA, AIR PANAMA
*            AVIANCA, TACA
* AIRLINE 13 ALM AND TAN
* AIRLINE 14 AIR FRANCE AND BAHAMAS
*            AVIATECA, LACSA
* AIRLINE 15 AIR FLORIDA
*
GRTRANSP DOM=1,PVTCAR=44,CRENT=16,TAXI=20,BUS=20.
GRTRANSP INT=1,PVTCAR=44,CRENT=16,TAXI=20,BUS=20.
BUS/LIMO ARVBUS=10.DEPBUS=10.
*
PARM  WWGATE=19,GRGATE=12.GREET=43,CIRCPK=30.CURBCK=30.
PARM CRBGT=24,PRKCRB=50.
*
*
%PRETICKETED DOM=55.DOMDIR=30.
AIRLINE LINES=1,EPCURB=1. EXPCHK=100.
AIRLINE LINES=2,EPCURB=6. EXPCHK=10.
AIRLINE LINES=3,EPCURB=4. EXPCHK=40.
AIRLINE LINES=4,EPCURB=2.
AIRLINE LINES=5,EPCURB=8. EXPCHK=58.
AIRLINE LINES=6,EPCURB=5.
AIRLINE LINES=7,EPCURB=8. EXPCHK=25.
AIRLINE LINES=8,EPCURB=3. EXPCHK=40.
AIRLINE LINES=9,EPCURB=5. EXPCHK=40.
AIRLINE LINES=10,EPCURB=3.
AIRLINE LINES=11,EPCURB=6.
AIRLINE LINES=12,EPCURB=2,EXPCHK=40.
AIRLINE LINES=13,EPCURB=5.
AIRLINE LINES=14,EPCURB=6.
AIRLINE LINES=15,EPCURB=2.
*
*
*  TICKETING & CHECKIN
*
TICKETS&CHECKIN   FACNO=1,  XY=3057,2843, POINT=1,  AIRLIN=2,  AGENTS=14,
TICKETS&CHECKIN   FACNO=2.  XY=3147,2941. POINT=2.  AIRLIN=5,  AGENTS=1,
TICKETS&CHECKIN   FACNO=3.  XY=3137,2853, POINT=3,  AIRLIN=7,  AGENTS=4,
```

```
TICKETS&CHECKIN   FACNO=4,  XY=3154,2846, POINT=4,  AIRLIN=11, AGENTS=3,
TICKETS&CHECKIN   FACNO=5,  XY=3206,2875, POINT=5,  AIRLIN=6,  AGENTS=6,
TICKETS&CHECKIN   FACNO=6,  XY=3219,2881, POINT=6,  AIRLIN=8,  AGENTS=2,
TICKETS&CHECKIN   FACNO=7,  XY=3264,2944, POINT=7,  AIRLIN=9,  AGENTS=4,
TICKETS&CHECKIN   FACNO=8,  XY=3269,2986, POINT=8,  AIRLIN=3,  AGENTS=7,
TICKETS&CHECKIN   FACNO=9,  XY=3269,3066, POINT=9,  AIRLIN=10, AGENTS=22,
TICKETS&CHECKIN   FACNO=10, XY=3241,3164, POINT=10, AIRLIN=4,  AGENTS=6,
TICKETS&CHECKIN   FACNO=11, XY=3147,3212, POINT=11, AIRLIN=1,  AGENTS=14,
TICKETS&CHECKIN   FACNO=12,               POINT=10, AIRLIN=12, AGENTS=23,
TICKETS&CHECKIN   FACNO=13,               POINT=7,  AIRLIN=13, AGENTS=8,
TICKETS&CHECKIN   FACNO=14,               POINT=2,  AIRLIN=14, AGENTS=8,
TICKETS&CHECKIN   FACNO=15,               POINT=10, AIRLIN=15, AGENTS=2,
*
* SECURITY
*
SECURITY FACNO=1,  POINT=13, XY=3054,3256,  AGENTS=1,
SECURITY FACNO=2,  POINT=14, XY=3197,3261,  AGENTS=2,
SECURITY FACNO=3,  POINT=15, XY=3282,3159,  AGENTS=1,
SECURITY FACNO=4,  POINT=16, XY=3307,3036,  AGENTS=1,
SECURITY FACNO=5,  POINT=17, XY=3282,2903,  AGENTS=1,
SECURITY FACNO=6,  POINT=18, XY=3195,2850,  AGENTS=2,
SECURITY FACNO=7,  POINT=19, XY=3062,2788,  AGENTS=1,
*
* BAG CLAIM
*
BAGCLAIM FACNO=1,  POINT=20, XY=3122,2860,  NOEPLC=6,
BAGCLAIM FACNO=2,  POINT=21, XY=3161,2881,  NOEPLC=5,
BAGCLAIM FACNO=3,  POINT=20,                NOEPLC=5,
BAGCLAIM FACNO=4,  POINT=24, XY=3220,2916,  NOEPLC=5,
BAGCLAIM FACNO=5,  POINT=24,                NOEPLC=4,
BAGCLAIM FACNO=6,  POINT=25, XY=3226,2932,  NOEPLC=4,
BAGCLAIM FACNO=7,  POINT=26, XY=3242,2987,  NOEPLC=4,
BAGCLAIM FACNO=8,  POINT=27, XY=3249,3010,  NOEPLC=4,
BAGCLAIM FACNO=9,  POINT=28, XY=3222,3148,  NOEPLC=3,
BAGCLAIM FACNO=10, POINT=29, XY=3203,3167,  NOEPLC=3,
BAGCLAIM FACNO=11, POINT=30, XY=3194,3174,  NOEPLC=2,
BAGCLAIM FACNO=12, POINT=31, XY=3183,3160,  NOEPLC=2,
BAGCLAIM FACNO=13, POINT=33, XY=3146,3159,  NOEPLC=2,
BAGCLAIM FACNO=14, POINT=33,                NOEPLC=2,
BAGCLAIM FACNO=15, POINT=33,                NOEPLC=1,
BAGCLAIM FACNO=16, POINT=33,                NOEPLC=1,
BAGCLAIM FACNO=17, POINT=28,                NOEPLC=3,
*
*  RENT A CAR
*
RENTACAR FACNO=1,  POINT=36, XY=3194,3181, AGENCY=1, AGENTS=2, NPARKL=6,
RENTACAR FACNO=2,  POINT=37, XY=3233,2982, AGENCY=2, AGENTS=2, NPARKL=6,
RENTACAR FACNO=3,  POINT=38, XY=3111,2866, AGENCY=3, AGENTS=2, NPARKL=6,
RENTACAR FACNO=4,  POINT=38,               AGENCY=4, AGENTS=2, NPARKL=6,
RENTACAR FACNO=5,  POINT=38,               AGENCY=5, AGENTS=2, NPARKL=6,
*
IMMIGRATION FACNO=1,POINT=39,XY=3265,3055, AGENTS=16,NCUST=1,
*
CUSTOMS      FACNO=1,POINT=28,             AGENTS=10,NOEPLC=3,
*
*
PARKING  FACNO=1,  POINT=42, XY=3146,3030,  AGENTS=2,
PARKING  FACNO=2,  POINT=43, XY=3066,2957,  AGENTS=2,
PARKING  FACNO=3,  POINT=44, XY=3066,3109,  AGENTS=2,
PARKING  FACNO=4,  POINT=45, XY=2987,2957,  AGENTS=2,
PARKING  FACNO=5,  POINT=46, XY=2987,3109,  AGENTS=4,
```

```
PARKING  FACNO=6,   POINT=47, XY=2920,2926,   AGENTS=2,
*
ENPLCURB FACNO=1,   POINT=48, XY=3070,3205,   SIZE=37,
ENPLCURB FACNO=2,   POINT=49, XY=3133,3203,   SIZE=18,
ENPLCURB FACNO=3,   POINT=50, XY=3225,3111,   SIZE=10,
ENPLCURB FACNO=4,   POINT=51, XY=3226,2963,   SIZE=10,18,
ENPLCURB FACNO=5,   POINT=52, XY=3150,2869,   SIZE=10,18,
ENPLCURB FACNO=6,   POINT=53, XY=3082,2871,   SIZE=20,
*
DEPLCURB FACNO=1,   POINT=54, XY=3072,3204,    SIZE=40,
DEPLCURB FACNO=2,   POINT=55, XY=3141,3195,    SIZE=20,
DEPLCURB FACNO=3,   POINT=56, XY=3227,3101,    SIZE=30,
DEPLCURB FACNO=4,   POINT=57, XY=3227,2966,    SIZE=30,
DEPLCURB FACNO=5,   POINT=58, XY=3161,2900,    SIZE=20,
DEPLCURB FACNO=6,   POINT=59, XY=3081,2875,    SIZE=30,
*
ENTRANCE FACNO=1,   POINT=48,
ENTRANCE FACNO=2,   POINT=49,
ENTRANCE FACNO=3,   POINT=50,
ENTRANCE FACNO=4,   POINT=51,
ENTRANCE FACNO=5,   POINT=32,
ENTRANCE FACNO=6,   POINT=53,
ENTRANCE FACNO=7,   POINT=48,
ENTRANCE FACNO=8,   POINT=49,
ENTRANCE FACNO=9,   POINT=50,
ENTRANCE FACNO=10,  POINT=51,
ENTRANCE FACNO=11,  POINT=52,
ENTRANCE FACNO=12,  POINT=53,
*
*
GATE FACNO=1,                POINT=60,   XY=3368,3024,  NSECUR=1,   AGENTS=2,
GATE FACNO=2,3,4,            POINT=61,   XY=3121,3025,  NSECUR=1,   AGENTS=2,2,2,
GATE FACNO=5,6,              POINT=62,   XY=3109,3072,  NSECUR=1,   AGENTS=2,2,
GATE FACNO=7,                POINT=63,   XY=3406,3055,  NSECUR=1,   AGENTS=2,
GATE FACNO=8,9,              POINT=64,   XY=3278,3205,  NSECUR=2,   AGENTS=2,2,
GATE FACNO=10,11,            POINT=65,   XY=3311,3223,  NSECUR=2,   AGENTS=2,2,
GATE FACNO=12,13,            POINT=66,   XY=3393,3254,  NSECUR=2,   AGENTS=2,2,
GATE FACNO=14,15,            POINT=67,   XY=3435,3278,  NSECUR=2,   AGENTS=2,2,
GATE FACNO=16,               POINT=68,   XY=3461,3286,  NSECUR=2,   AGENTS=2,
GATE FACNO=17,               POINT=69,   XY=3445,3297,  NSECUR=2,   AGENTS=2,
GATE FACNO=18,19,            POINT=70,   XY=3467,3299,  NSECUR=2,   AGENTS=2,2,
GATE FACNO=20,               POINT=71,   XY=3199,3339,  NSECUR=3,   AGENTS=2,
GATE FACNO=21,NIMMI=1,       POINT=71,                  NSECUR=3,   AGENTS=2,
GATE FACNO=22,NIMMI=1,       POINT=72,   XY=3004,3427,  NSECUR=4,   AGENTS=2,
GATE FACNO=23,               POINT=72,                  NSECUR=4,   AGENTS=2,
GATE FACNO=24,25,NIMMI=1,POINT=73,       XY=3004,3447,  NSECUR=4,   AGENTS=2,2,
GATE FACNO=26,27,NIMMI=1,POINT=74,       XY=3007,3536,  NSECUR=4,   AGENTS=2,2,
GATE FACNO=28,               POINT=75,   XY=3036,3545,  NSECUR=4,   AGENTS=2,
GATE FACNO=29,NIMMI=1,       POINT=76,   XY=2965,3546,  NSECUR=4,   AGENTS=2,
GATE FACNO=30,               POINT=77,   XY=3042,3548,  NSECUR=4,   AGENTS=2,
GATE FACNO=31,NIMMI=1,       POINT=78,   XY=2958,3557,  NSECUR=4,   AGENTS=2,
GATE FACNO=32,33,            POINT=79,   XY=3023,3558,  NSECUR=4,   AGENTS=2,2,
GATE FACNO=34,35,NIMMI=1,POINT=80,       XY=3051,3817,  NSECUR=4,   AGENTS=2,2,
GATE FACNO=36,37,38,         POINT=81,   XY=2999,3845,NSECUR=4,NIMMI=1,AGENTS=2,2,2,
GATE FACNO=39,40,            POINT=82,   XY=3094,3817,  NSECUR=4,   AGENTS=2,2,
GATE FACNO=41,42,NIMMI=1,POINT=83,       XY=3156,3817,  NSECUR=4,   AGENTS=2,2,
GATE FACNO=43,44,            POINT=83,                  NSECUR=4,   AGENTS=2,2,
GATE FACNO=45,46,            POINT=84,   XY=2893,3313,  NSECUR=5,   AGENTS=2,2,
GATE FACNO=47,48,            POINT=85,   XY=2868,3363,  NSECUR=5,   AGENTS=2,2,
GATE FACNO=49,               POINT=86,   XY=2836,3362,  NSECUR=5,   AGENTS=2,
GATE FACNO=50,               POINT=87,   XY=2849,3420,  NSECUR=5,   AGENTS=2,
```

```
GATE FACNO=51,52,          POINT=88,    XY=2817,3451,  NSECUR=5,   AGENTS=2,2,
GATE FACNO=53,54,          POINT=89,    XY=2777,3495,  NSECUR=5,   AGENTS=2,2,
GATE FACNO=55,             POINT=90,    XY=2760,3511,  NSECUR=5,   AGENTS=2,
GATE FACNO=56,57,58,       POINT=91,    XY=2712,3491,  NSECUR=5,   AGENTS=2,2,2,
GATE FACNO=59,60,61,       POINT=92,    XY=2806,3202,  NSECUR=6,   AGENTS=2,2,2,
GATE FACNO=62,63,64,       POINT=93,    XY=2757,3219,  NSECUR=6,   AGENTS=2,2,2,
GATE FACNO=65,66,          POINT=94,    XY=2726,3257,  NSECUR=6,   AGENTS=2,2,
GATE FACNO=67,68,69,       POINT=95,    XY=2633,3289,  NSECUR=6,   AGENTS=2,2,2,
GATE FACNO=70,             POINT=96,    XY=2610,3310,  NSECUR=6,   AGENTS=2,
GATE FACNO=71,NIMMI=1,     POINT=96,                   NSECUR=6,   AGENTS=2,
GATE FACNO=72,             POINT=96,                   NSECUR=6,   AGENTS=2,
GATE FACNO=73,74,          POINT=97,    XY=2582,3320,  NSECUR=6,   AGENTS=2,2,
GATE FACNO=75,76,          POINT=98,    XY=2560,3331,  NSECUR=6,   AGENTS=2,2,
GATE FACNO=77,78,          POINT=99,    XY=2772,3065,  NSECUR=7,   AGENTS=2,2,
GATE FACNO=79,80,          POINT=100,   XY=2679,3062,  NSECUR=7,   AGENTS=2,2,
GATE FACNO=81,82,          POINT=101,   XY=2641,3064,  NSECUR=7,   AGENTS=2,2,
GATE FACNO=83,84,          POINT=102,   XY=2596,3062,  NSECUR=7,   AGENTS=2,2,
GATE FACNO=85,             POINT=103,   XY=2544,3035,  NSECUR=7,   AGENTS=2,
GATE FACNO=86,87,88,       POINT=104,   XY=2520,3063,  NSECUR=7,   AGENTS=2,2,2,
GATE FACNO=89,90,91,92,    POINT=105,   XY=2485,3061,  NSECUR=7,   AGENTS=2,2,2,2,
GATE FACNO=93,             POINT=106,   XY=3248,3483,  NSECUR=3,   AGENTS=2,
GATE FACNO=94,95,          POINT=107,   XY=3285,3532,  NSECUR=3,   AGENTS=2,2,
GATE FACNO=96,             POINT=107,                  NSECUR=3,   AGENTS=2,
GATE FACNO=97,             POINT=107,                  NSECUR=3,   AGENTS=2,
GATE FACNO=98,NIMMI=1,     POINT=108,   XY=2690,3030,  NSECUR=7,   AGENTS=2,
GATE FACNO=99,NIMMI=1,     POINT=109,   XY=2960,3030,  NSECUR=4,   AGENTS=2,
GATE FACNO=100,            POINT=91,    NSECUR=5,                  AGENTS=2,
GATE FACNO=101,            POINT=107,   NSECUR=3,                  AGENTS=2,
GATE FACNO=102,            POINT=107,   NSECUR=3,                  AGENTS=2,
GATE FACNO=103,104,        POINT=91,    NSECUR=5,                  AGENTS=2,2,
GATE FACNO=105,NIMMI=1,    POINT=107,   NSECUR=3,                  AGENTS=2,
*
*
*  EXPRESS CHECKIN
*
CHECKIN  FACNO=1,    POINT=1,   AIRLIN=2,  AGENTS=2,
CHECKIN  FACNO=2,    POINT=2,   AIRLIN=5,  AGENTS=1,
CHECKIN  FACNO=3,    POINT=3,   AIRLIN=7,  AGENTS=3,
CHECKIN  FACNO=6,    POINT=6,   AIRLIN=8,  AGENTS=2,
CHECKIN  FACNO=7,    POINT=7,   AIRLIN=9,  AGENTS=3,
CHECKIN  FACNO=8,    POINT=8,   AIRLIN=3,  AGENTS=7,
CHECKIN  FACNO=11,   POINT=12,  AIRLIN=1,  AGENTS=10,  XY=3114,3222,
CHECKIN  FACNO=12,   POINT=10,  AIRLIN=12,AGENTS=3,
*
TRANSFER ADD=180,DELETE=30,
*
DEPT FLTNO=001,AC=9,  PAX=100,TPAX=100,AIRLIN=10,TIME=1230,GATE=25,INT=1,
*
DEPT FLTNO=445,AC=747,PAX=171,TPAX=33,AIRLIN=10,TIME=1340,GATE=41,INT=1,
DEPT FLTNO=503,AC=707,PAX=120,TPAX=26,AIRLIN=10,TIME=1450,GATE=25,INT=1,
*
DEPT FLTNO=303,AC=727,PAX=153,TPAX=153,AIRLIN=12,TIME=1503,GATE=99,INT=1,
*
DEPT FLTNO=355,AC=737,PAX=110,TPAX=0, AIRLIN=14,TIME=1320,GATE=37,INT=1,
DEPT FLTNO=351,AC=737,PAX=60,  TPAX=0, AIRLIN=14,TIME=1445,GATE=34,INT=1,
*
DEPT FLTNO=913,AC=11,  PAX=260,TPAX=7,  AIRLIN=9,  TIME=1230,GATE=71,INT=1,
DEPT FLTNO=933,AC=747,PAX=363,TPAX=37,AIRLIN=9,  TIME=1410,GATE=71,INT=1,
*
DEPT FLTNO=911,AC=9,  PAX=62,  TPAX=0,  AIRLIN=12,TIME=1501,      GATE=105,INT=1,
*
```

```
DEPT FLTNO=924,AC=9,  PAX=54, TPAX=0, AIRLIN=12,TIME=1500,       GATE=21, INT=1,
DEPT FLTNO=931,AC=9,  PAX=63, TPAX=0, AIRLIN=14,TIME=1445,       GATE=42, INT=1,
DEPT FLTNO=951,AC=727,PAX=118,TPAX=0, AIRLIN=12,TIME=1450,       GATE=36, INT=1,
DEPT FLTNO=961,AC=9,  PAX=79, TPAX=0, AIRLIN=14,TIME=1400,       GATE=98, INT=1,
DEPT FLTNO=971,AC=9,  PAX=56, TPAX=0, AIRLIN=12,TIME=1445,       GATE=22, INT=1,
DEPT FLTNO=981,AC=9,  PAX=59, TPAX=0, AIRLIN=12,TIME=1249,       GATE=36, INT=1,
DEPT FLTNO=982,AC=9,  PAX=71, TPAX=0, AIRLIN=12,TIME=1400,       GATE=35, INT=1,
*
DEPT FLTNO=493,AC=727,PAX=101,TPAX=47,AIRLIN=11,TIME=1500,GATE=76,
DEPT FLTNO=497,AC=727,PAX=127,TPAX=7, AIRLIN=11,TIME=1330,GATE=76,
*
DEPT FLTNO=218,AC=9,  PAX=98, TPAX=7, AIRLIN=5, TIME=1241,GATE=75,
DEPT FLTNO=221,AC=9,  PAX=94, TPAX=70,AIRLIN=5, TIME=1345,GATE=75,
DEPT FLTNO=416,AC=9,  PAX=66, TPAX=42,AIRLIN=5, TIME=1455,GATE=75,
DEPT FLTNO=709,AC=10, PAX=216,TPAX=13,AIRLIN=6, TIME=1300,GATE=67,
DEPT FLTNO=27, AC=10, PAX=187,TPAX=5, AIRLIN=6, TIME=1340,GATE=69,
DEPT FLTNO=721,AC=10, PAX=208,TPAX=2, AIRLIN=6, TIME=1445,GATE=72,
DEPT FLTNO=731,AC=727,PAX=113,TPAX=16,AIRLIN=6, TIME=1515,GATE=65,
DEPT FLTNO=232,AC=727,PAX=100,TPAX=0, AIRLIN=6, TIME=1230,GATE=65,
*
DEPT FLTNO=106,AC=727,PAX=95, TPAX=0, AIRLIN=3, TIME=1210,GATE=55,
DEPT FLTNO=82, AC=727,PAX=111,TPAX=0, AIRLIN=3, TIME=1215,GATE=52,
DEPT FLTNO=43, AC=727,PAX=146,TPAX=0, AIRLIN=3, TIME=1230,GATE=54,
DEPT FLTNO=136,AC=10, PAX=138,TPAX=0, AIRLIN=3, TIME=1335,GATE=55,
DEPT FLTNO=27, AC=10, PAX=213,TPAX=0, AIRLIN=3, TIME=1340,GATE=50,
DEPT FLTNO=72, AC=727,PAX=81, TPAX=0, AIRLIN=3, TIME=1420,GATE=48,
*
DEPT FLTNO=154,AC=300,PAX=200,TPAX=134,AIRLIN=1, TIME=1136,GATE=2,
DEPT FLTNO=308,AC=107,PAX=29, TPAX=6,  AIRLIN=1, TIME=1140,GATE=94,
DEPT FLTNO=18, AC=107,PAX=105,TPAX=8,  AIRLIN=1, TIME=1200,GATE=5,
DEPT FLTNO=76, AC=137,PAX=123,TPAX=24, AIRLIN=1, TIME=1200,GATE=11,
DEPT FLTNO=256,AC=9,  PAX=115,TPAX=24, AIRLIN=1, TIME=1225,GATE=8,
DEPT FLTNO=953,AC=268,PAX=104,TPAX=7,  AIRLIN=1, TIME=1207,GATE=14,
DEPT FLTNO=680,AC=107,PAX=64, TPAX=10, AIRLIN=1, TIME=1210,GATE=13,
DEPT FLTNO=894,AC=9,  PAX=67, TPAX=7,  AIRLIN=1, TIME=1210,GATE=9,
DEPT FLTNO=190,AC=137,PAX=128,TPAX=35, AIRLIN=1, TIME=1212,GATE=1,
DEPT FLTNO=303,AC=259,PAX=171,TPAX=37, AIRLIN=1, TIME=1250,GATE=6,
DEPT FLTNO=31, AC=107,PAX=104,TPAX=41, AIRLIN=1, TIME=1240,GATE=94,
DEPT FLTNO=321,AC=107,PAX=83, TPAX=54, AIRLIN=1, TIME=1225,GATE=12,
DEPT FLTNO=42, AC=137,PAX=137,TPAX=24, AIRLIN=1, TIME=1243,GATE=19,
DEPT FLTNO=182,AC=268,PAX=194,TPAX=21, AIRLIN=1, TIME=1245,GATE=4,
DEPT FLTNO=18, AC=107,PAX=101,TPAX=21, AIRLIN=1, TIME=1300,GATE=10,
DEPT FLTNO=726,AC=9,  PAX=65, TPAX=9,  AIRLIN=1, TIME=1315,GATE=12,
DEPT FLTNO=175,AC=107,PAX=92, TPAX=40, AIRLIN=1, TIME=1320,GATE=11,
DEPT FLTNO=174,AC=9,  PAX=88, TPAX=11, AIRLIN=1, TIME=1325,GATE=13,
DEPT FLTNO=637,AC=268,PAX=268,TPAX=136,AIRLIN=1, TIME=1325,GATE=2,
DEPT FLTNO=953,AC=268,PAX=211,TPAX=105,AIRLIN=1, TIME=1345,GATE=1,
DEPT FLTNO=993,AC=107,PAX=91, TPAX=59, AIRLIN=1, TIME=1415,GATE=19,
DEPT FLTNO=6,  AC=137,PAX=123,TPAX=6,  AIRLIN=1, TIME=1350,GATE=18,
DEPT FLTNO=181,AC=268,PAX=263,TPAX=154,AIRLIN=1, TIME=1355,GATE=5,
DEPT FLTNO=898,AC=9,  PAX=86, TPAX=19, AIRLIN=1, TIME=1344,GATE=9,
DEPT FLTNO=192,AC=137,PAX=84, TPAX=34, AIRLIN=1, TIME=1350,GATE=4,
DEPT FLTNO=20, AC=268,PAX=132,TPAX=21, AIRLIN=1, TIME=1400,GATE=17,
DEPT FLTNO=326,AC=9,  PAX=92, TPAX=19, AIRLIN=1, TIME=1447,GATE=12,
DEPT FLTNO=22, AC=107,PAX=85, TPAX=10, AIRLIN=1, TIME=1500,GATE=14,
*
DEPT FLTNO=102,AC=727,PAX=123,TPAX=13,AIRLIN=2, TIME=1201,GATE=94,
DEPT FLTNO=654,AC=9,  PAX=60, TPAX=0, AIRLIN=2, TIME=1225,GATE=83,
DEPT FLTNO=742,AC=9,  PAX=87, TPAX=0, AIRLIN=2, TIME=1241,GATE=98,
DEPT FLTNO=962,AC=8,  PAX=148,TPAX=34,AIRLIN=2, TIME=1300,GATE=84,
DEPT FLTNO=358,AC=727,PAX=120,TPAX=12,AIRLIN=2, TIME=1300,GATE=69,
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DEPT FLTNO=552,AC=727,PAX=125,TPAX=6, AIRLIN=2, TIME=1310,GATE=81,
DEPT FLTNO=354,AC=727,PAX=134,TPAX=0, AIRLIN=2, TIME=1315,GATE=82,
DEPT FLTNO=122,AC=11, PAX=264,TPAX=72,AIRLIN=2, TIME=1315,GATE=92,
DEPT FLTNO=516,AC=727,PAX=120,TPAX=0, AIRLIN=2, TIME=1335,GATE=80,
DEPT FLTNO=136,AC=11, PAX=211,TPAX=55,AIRLIN=2, TIME=1340,GATE=91,
DEPT FLTNO=130,AC=11, PAX=57, TPAX=0, AIRLIN=2, TIME=1420,GATE=89,
DEPT FLTNO=238,AC=9,  PAX=94, TPAX=0, AIRLIN=2, TIME=1445,GATE=86,
*
DEPT FLTNO=367,AC=10, PAX=103,TPAX=22,AIRLIN=8, TIME=1325,GATE=72,
*
DEPT FLTNO=72, AC=727,PAX=78, TPAX=0, AIRLIN=4, TIME=1250,GATE=95,
DEPT FLTNO=909,AC=8,  PAX=118,TPAX=0, AIRLIN=4, TIME=1345,GATE=93,
DEPT FLTNO=152,AC=727,PAX=62, TPAX=0, AIRLIN=4, TIME=1405,GATE=95,
DEPT FLTNO=322,AC=727,PAX=55, TPAX=0, AIRLIN=4, TIME=1430,GATE=97,
DEPT FLTNO=228,AC=727,PAX=73, TPAX=0, AIRLIN=4, TIME=1515,GATE=95,
*
DEPT FLTNO=912,AC=9,  PAX=54, TPAX=0, AIRLIN=15,TIME=1502,      GATE=20,
DEPT FLTNO=921,AC=9,  PAX=62, TPAX=0, AIRLIN=15,TIME=1140,      GATE=20,
DEPT FLTNO=922,AC=9,  PAX=83, TPAX=0, AIRLIN=15,TIME=1205,      GATE=102,
DEPT FLTNO=923,AC=9,  PAX=83, TPAX=0, AIRLIN=15,TIME=1425,      GATE=102,
*
ARRV FLTNO=800,AC=11, PAX=71, TPAX=28,AIRLIN=13,TIME=1322,BAG=17,GATE=29, INT=1,
ARRV FLTNO=442,AC=747,PAX=405,TPAX=81,AIRLIN=10,TIME=1222,BAG=8,GATE=41,INT=1,
ARRV FLTNO=436,AC=707,PAX=146,TPAX=34,AIRLIN=10,TIME=1201,BAG=8,GATE=26,INT=1,
ARRV FLTNO=568,AC=707,PAX=147,TPAX=42,AIRLIN=10,TIME=1152,BAG=8,GATE=25,INT=1,
ARRV FLTNO=504,AC=707,PAX=146,TPAX=26,AIRLIN=10,TIME=1435,BAG=8,GATE=27,INT=1,
*
ARRV FLTNO=301,AC=727,PAX=152,TPAX=152,AIRLIN=12,TIME=1438,BAG=17,GATE=99,INT=1,
ARRV FLTNO=979,AC=9,  PAX=83, TPAX=12, AIRLIN=13,TIME=1405,GATE=41,BAG=17,INT=1,
*
ARRV FLTNO=354,AC=737,PAX=115,TPAX=0,  AIRLIN=14,TIME=1245,GATE=37,BAG=17,INT=1,
ARRV FLTNO=350,AC=737,PAX=86, TPAX=0,  AIRLIN=14,TIME=1345,GATE=34,BAG=17,INT=1,
*
ARRV FLTNO=910,AC=11, PAX=271,TPAX=15, AIRLIN=9,TIME=1114,GATE=71, BAG=6,
ARRV FLTNO=930,AC=747,PAX=365,TPAX=60, AIRLIN=9,TIME=1241,GATE=71, BAG=6,
ARRV FLTNO=912,AC=11, PAX=267,TPAX=10, AIRLIN=9,TIME=1442,GATE=71, BAG=6,
*
ARRV FLTNO=900,INT=1,PAX=92, TPAX=0, AIRLIN=14,TIME=1320,BAG=17,GATE=42, AC=9,
ARRV FLTNO=066,INT=1,PAX=126,TPAX=0, AIRLIN=12,TIME=1425,BAG=17,GATE=31, AC=727,
ARRV FLTNO=030,INT=1,PAX=186,TPAX=0, AIRLIN=12,TIME=1435,BAG=17,GATE=24, AC=727,
ARRV FLTNO=302,INT=1,PAX=126,TPAX=0, AIRLIN=12,TIME=1350,BAG=17,GATE=36, AC=727,
ARRV FLTNO=620,INT=1,PAX=101,TPAX=0, AIRLIN=14,TIME=1118,BAG=17,GATE=38, AC=727,
ARRV FLTNO=624,INT=1,PAX=101,TPAX=0, AIRLIN=14,TIME=1300,BAG=17,GATE=38, AC=727,
ARRV FLTNO=310,INT=1,PAX=77, TPAX=0, AIRLIN=12,TIME=1258,BAG=17,GATE=22, AC=9,
ARRV FLTNO=820,INT=1,PAX=200,TPAX=0, AIRLIN=12,TIME=1240,BAG=17,GATE=25, AC=8,
ARRV FLTNO=822,INT=1,PAX=136,TPAX=0, AIRLIN=12,TIME=1140,BAG=17,GATE=31, AC=8,
ARRV FLTNO=023,INT=1,PAX=100,TPAX=0, AIRLIN=9, TIME=1205,BAG=17,GATE=71, AC=9,
ARRV FLTNO=410,INT=1,PAX=100,TPAX=0, AIRLIN=14,TIME=1210,BAG=17,GATE=35,AC=8,
ARRV FLTNO=400,INT=1,PAX=100,TPAX=0, AIRLIN=12,TIME=1235,BAG=17,GATE=24,AC=9,
ARRV FLTNO=100,INT=1,PAX=108,TPAX=0, AIRLIN=12,TIME=1340,BAG=17,GATE=28, AC=727,
ARRV FLTNO=101,INT=1,PAX=159,TPAX=0, AIRLIN=12,TIME=1350,BAG=17,GATE=29, AC=727,
*
ARRV FLTNO=215,AC=9,  PAX=78, TPAX=15,AIRLIN=5, TIME=1225,BAG=2,GATE=75,
ARRV FLTNO=221,AC=9,  PAX=63, TPAX=5, AIRLIN=5, TIME=1321,BAG=2,GATE=75,
ARRV FLTNO=211,AC=9,  PAX=80, TPAX=4, AIRLIN=5, TIME=1424,BAG=2,GATE=75,
*
ARRV FLTNO=26, AC=10, PAX=236,TPAX=12,AIRLIN=6, TIME=1202,BAG=4,GATE=67,
ARRV FLTNO=700,AC=10, PAX=235,TPAX=9, AIRLIN=6, TIME=1305,BAG=4,GATE=69,
ARRV FLTNO=710,AC=727,PAX=126,TPAX=21,AIRLIN=6, TIME=1313,BAG=4,GATE=65,
ARRV FLTNO=720,AC=10, PAX=221,TPAX=28,AIRLIN=6, TIME=1344,BAG=4,GATE=72,
ARRV FLTNO=730,AC=727,PAX=123,TPAX=24,AIRLIN=6, TIME=1358,BAG=4,GATE=67,
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ARRV FLTNO=722,AC=727,PAX=123,TPAX=9, AIRLIN=6, TIME=1444,BAG=4,GATE=69,
ARRV FLTNO=211,AC=727,PAX=30, TPAX=5, AIRLIN=6, TIME=1420,BAG=4,GATE=66,
ARRV FLTNO=212,AC=727,PAX=87, TPAX=0, AIRLIN=6, TIME=1207,BAG=4,GATE=65,
*
ARRV FLTNO=133,AC=727,PAX=128,TPAX=0, AIRLIN=3, TIME=1149,BAG=7,GATE=54,
ARRV FLTNO=81, AC=10, PAX=258,TPAX=0, AIRLIN=3, TIME=1227,BAG=7,GATE=55,
ARRV FLTNO=186,AC=727,PAX=129,TPAX=0, AIRLIN=3, TIME=1216,BAG=7,GATE=53,
ARRV FLTNO=55, AC=10, PAX=265,TPAX=0, AIRLIN=3, TIME=1257,BAG=7,GATE=50,
ARRV FLTNO=115,AC=727,PAX=107,TPAX=0, AIRLIN=3, TIME=1342,BAG=7,GATE=52,
ARRV FLTNO=99, AC=10, PAX=263,TPAX=0, AIRLIN=3, TIME=1503,BAG=7,GATE=54,
*
ARRV FLTNO=303,AC=268,PAX=154,TPAX=75, AIRLIN=1, TIME=1139,BAG=13,GATE=6,
ARRV FLTNO=9,  AC=137,PAX=137,TPAX=15, AIRLIN=1, TIME=1145,BAG=15,GATE=19,
ARRV FLTNO=7,  AC=268,PAX=268,TPAX=38, AIRLIN=1, TIME=1158,BAG=14,GATE=17,
ARRV FLTNO=31, AC=107,PAX=119,TPAX=4,  AIRLIN=1, TIME=1210,BAG=15,GATE=94,
ARRV FLTNO=321,AC=107,PAX=78, TPAX=22, AIRLIN=1, TIME=1151,BAG=16,GATE=12,
ARRV FLTNO=41, AC=268,PAX=258,TPAX=103,AIRLIN=1, TIME=1222,BAG=13,GATE=2,
ARRV FLTNO=521,AC=107,PAX=92, TPAX=21, AIRLIN=1, TIME=1221,BAG=15,GATE=10,
ARRV FLTNO=175,AC=107,PAX=98, TPAX=40, AIRLIN=1, TIME=1229,BAG=14,GATE=11,
ARRV FLTNO=891,AC=9,  PAX=80, TPAX=20, AIRLIN=1, TIME=1231,BAG=15,GATE=9,
ARRV FLTNO=953,AC=268,PAX=173,TPAX=80, AIRLIN=1, TIME=1230,BAG=13,GATE=1,
ARRV FLTNO=283,AC=9,  PAX=81, TPAX=26, AIRLIN=1, TIME=1241,BAG=14,GATE=12,
ARRV FLTNO=609,AC=9,  PAX=81, TPAX=50, AIRLIN=1, TIME=1255,BAG=16,GATE=13,
ARRV FLTNO=993,AC=107,PAX=85, TPAX=24, AIRLIN=1, TIME=1302,BAG=15,GATE=14,
ARRV FLTNO=173,AC=137,PAX=116,TPAX=37, AIRLIN=1, TIME=1244,BAG=13,GATE=18,
ARRV FLTNO=11, AC=137,PAX=119,TPAX=5,  AIRLIN=1, TIME=1302,BAG=15,GATE=4,
ARRV FLTNO=181,AC=268,PAX=217,TPAX=64, AIRLIN=1, TIME=1248,BAG=14,GATE=5,
ARRV FLTNO=731,AC=9,  PAX=79, TPAX=5,  AIRLIN=1, TIME=1341,BAG=16,GATE=12,
ARRV FLTNO=15, AC=268,PAX=268,TPAX=26, AIRLIN=1, TIME=1345,BAG=14,GATE=2,
ARRV FLTNO=37, AC=107,PAX=107,TPAX=16, AIRLIN=1, TIME=1412,BAG=13,GATE=5,
ARRV FLTNO=17, AC=268,PAX=268,TPAX=15, AIRLIN=1, TIME=1446,BAG=14,GATE=4,
ARRV FLTNO=5,  AC=107,PAX=107,TPAX=8,  AIRLIN=1, TIME=1513,BAG=15,GATE=1,
ARRV FLTNO=233,AC=9,  PAX=89, TPAX=6,  AIRLIN=1, TIME=1455,BAG=16,GATE=94,
ARRV FLTNO=118,AC=107,PAX=94, TPAX=27, AIRLIN=1, TIME=1503,BAG=13,GATE=18,
ARRV FLTNO=307,AC=258,PAX=89, TPAX=5,  AIRLIN=1, TIME=1504,BAG=14,GATE=6,
ARRV FLTNO=43, AC=107,PAX=107,TPAX=4,  AIRLIN=1, TIME=1503,BAG=15,GATE=5,
ARRV FLTNO=262,AC=9,  PAX=92, TPAX=23, AIRLIN=1, TIME=1513,BAG=15,GATE=10,
*
ARRV FLTNO=801,AC=9,  PAX=69, TPAX=0,  AIRLIN=2, TIME=1130,GATE=83,BAG=1,
ARRV FLTNO=963,AC=3,  PAX=185,TPAX=0,  AIRLIN=2, TIME=1142,GATE=84,BAG=1,
ARRV FLTNO=735,AC=9,  PAX=50, TPAX=0,  AIRLIN=2, TIME=1156,GATE=98,BAG=1,
ARRV FLTNO=131,AC=11, PAX=256,TPAX=0,  AIRLIN=2, TIME=1215,GATE=92,BAG=1,
ARRV FLTNO=441,AC=727,PAX=134,TPAX=0,  AIRLIN=2, TIME=1224,GATE=89,BAG=1,
ARRV FLTNO=101,AC=727,PAX=136,TPAX=0,  AIRLIN=2, TIME=1245,GATE=81,BAG=1,
ARRV FLTNO=207,AC=727,PAX=107,TPAX=0,  AIRLIN=2, TIME=1228,GATE=82,BAG=1,
ARRV FLTNO=465,AC=727,PAX=137,TPAX=0,  AIRLIN=2, TIME=1227,GATE=85,BAG=1,
ARRV FLTNO=135,AC=11, PAX=256,TPAX=0,  AIRLIN=2, TIME=1250,GATE=91,BAG=1,
ARRV FLTNO=435,AC=727,PAX=95, TPAX=0,  AIRLIN=2, TIME=1326,GATE=80,BAG=1,
ARRV FLTNO=129,AC=11, PAX=99, TPAX=0,  AIRLIN=2, TIME=1252,GATE=86,BAG=1,
ARRV FLTNO=719,AC=9,  PAX=32, TPAX=0,  AIRLIN=2, TIME=1405,GATE=88,BAG=1,
ARRV FLTNO=145,AC=11, PAX=264,TPAX=0,  AIRLIN=2, TIME=1417,GATE=91,BAG=1,
ARRV FLTNO=130,AC=11, PAX=112,TPAX=0,  AIRLIN=2, TIME=1356,GATE=89,BAG=1,
ARRV FLTNO=403,AC=727,PAX=98, TPAX=0,  AIRLIN=2, TIME=1456,GATE=85,BAG=1,
*
ARRV FLTNO=954,AC=10, PAX=200,TPAX=0,  AIRLIN=8, TIME=1207,GATE=72, BAG=5,
*
ARRV FLTNO=79, AC=727,PAX=129,TPAX=0,  AIRLIN=4, TIME=1200,GATE=95, BAG=9,
ARRV FLTNO=47, AC=727,PAX=130,TPAX=0,  AIRLIN=4, TIME=1320,GATE=95, BAG=9,
ARRV FLTNO=381,AC=727,PAX=71, TPAX=0,  AIRLIN=4, TIME=1335,GATE=97, BAG=9,
ARRV FLTNO=906,AC=8,  PAX=142,TPAX=0,  AIRLIN=4, TIME=1335,GATE=30, BAG=17,
ARRV FLTNO=287,AC=727,PAX=67, TPAX=0,  AIRLIN=4, TIME=1430,GATE=95, BAG=9,
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ARRV FLTNO=908,AC=8,  PAX=141,TPAX=0,  AIRLIN=4, TIME=1430,GATE=39, BAG=17,
*
ARRV FLTNO=801,        PAX=83, TPAX=0, AIRLIN=15,TIME=1101,BAG=9, GATE=102,AC=9,
ARRV FLTNO=802,        PAX=83, TPAX=0, AIRLIN=15,TIME=1110,BAG=9, GATE=20, AC=9,
ARRV FLTNO=803,        PAX=53, TPAX=0, AIRLIN=15,TIME=1339,BAG=9, GATE=96, AC=9,
ARRV FLTNO=804,        PAX=83, TPAX=0, AIRLIN=15,TIME=1345,BAG=9, GATE=101,AC=9,
*
*     OAG SCHEDULE
*
DEPT FLTNO=124,AC=3,  PAX=50, TPAX=0, AIRLIN=15,TIME=1200,GATE=47,
DEPT FLTNO=268,AC=727,PAX=85, TPAX=28,AIRLIN=7, TIME=1220,GATE=60,
DEPT FLTNO=71, AC=4,  PAX=76, TPAX=76,AIRLIN=15,TIME=1315,GATE=101,
DEPT FLTNO=212,AC=3,  PAX=50, TPAX=0, AIRLIN=15,TIME=1250,GATE=68,
DEPT FLTNO=411,AC=8,  PAX=100,TPAX=0, AIRLIN=12,TIME=1320,GATE=28,
DEPT FLTNO=534,AC=727,PAX=62, TPAX=21,AIRLIN=7, TIME=1330,GATE=61,
DEPT FLTNO=978,AC=727,PAX=84, TPAX=38,AIRLIN=7, TIME=1340,GATE=62,
DEPT FLTNO=222,AC=2,  PAX=50, TPAX=0, AIRLIN=15,TIME=1345,GATE=68,
DEPT FLTNO=22, AC=9,  PAX=75, TPAX=0, AIRLIN=9, TIME=1400,GATE=73,
DEPT FLTNO=650,AC=727,PAX=97, TPAX=32,AIRLIN=7, TIME=1405,GATE=61,
DEPT FLTNO=401,AC=9,  PAX=75, TPAX=0, AIRLIN=9, TIME=1415,GATE=38,
DEPT FLTNO=103,AC=2,  PAX=100,TPAX=30,AIRLIN=15,TIME=1430,GATE=45,
*
ARRV FLTNO=124,AC=3,  PAX=50, TPAX=0, AIRLIN=15,TIME=1153,GATE=80,
ARRV FLTNO=121,AC=3,  PAX=50, TPAX=0, AIRLIN=15,TIME=1225,GATE=80,
ARRV FLTNO=559,AC=727,PAX=115,TPAX=38,AIRLIN=7, TIME=1227,GATE=60,
ARRV FLTNO=102,AC=727,PAX=100,TPAX=30,AIRLIN=15,TIME=1230,GATE=45,
ARRV FLTNO=977,AC=727,PAX=80, TPAX=27,AIRLIN=7, TIME=1240,GATE=61,
ARRV FLTNO=563,AC=727,PAX=85, TPAX=28,AIRLIN=7, TIME=1240,GATE=62,
ARRV FLTNO=505,AC=10, PAX=233,TPAX=78,AIRLIN=7, TIME=1240,GATE=63,
ARRV FLTNO=496,AC=727,PAX=101,TPAX=35,AIRLIN=11,TIME=1355,GATE=59,
*
*    ADDITIONAL OAG FLIGHTS (LISTED)
*
DEPT FLTNO=710,AC=48, PAX=23, TPAX=0,AIRLIN=14,TIME=1330,GATE=61,
DEPT FLTNO=243,AC=11, PAX=23, TPAX=0, AIRLIN=14,TIME=1330,GATE=63,
DEPT FLTNO=101,AC=727,PAX=66, TPAX=0, AIRLIN=12,TIME=1455,GATE=44,
DEPT FLTNO=303,AC=727,PAX=115,TPAX=0, AIRLIN=12,TIME=1420,GATE=23,
DEPT FLTNO=311,AC=11, PAX=58, TPAX=0, AIRLIN=12,TIME=1445,GATE=24,
DEPT FLTNO=75, AC=4,  PAX=90, TPAX=80,AIRLIN=15,TIME=1430,GATE=94,
DEPT FLTNO=901,AC=11, PAX=63, TPAX=0, AIRLIN=14,TIME=1445,GATE=38,
*
ARRV FLTNO=171,AC=727,PAX=50, TPAX=0, AIRLIN=15,TIME=1153,GATE=80,
*
TIMESERIES  GPSTO=23,22,19,44,46,49,50,52,55,68,70,73,74,76,79,
TIMESERIES  GPQUE=23,22,186,188,191,192,195,8,11,35,36,37,38,39,40,41,34,42,
TIMESERIES  GPHALF=33,28,24,20,111,115,116,117,
*
CHANGE TIME=1125,SERVRS='TICK',8,8,
CHANGE TIME=1200,SERVRS='TICK',2,4,4,4,7,7,9,7,10,5,11,13,
CHANGE TIME=1220,SERVRS='TICK',10,7,
CHANGE TIME=1200,SERVRS='TICK',8,4,'CHEC',8,4,
CHANGE TIME=1320,SERVRS='TICK',3,5,9,4,
CHANGE TIME=1335,SERVRS='TICK',7,3,
CHANGE TIME=1400,SERVRS='TICK',2,3,3,8,4,3,
CHANGE TIME=1415,SERVRS='TICK',3,5,'SECU',4,1,
```

5.3 GPSS DATA SUMMARY

5.3.1 Auxiliary Program

This program uses the following GPSS distribution functions:

- o Arrival time distribution functions
- o Out-of-System transfer passenger distribution functions.
- o Enplaning-passengers-per-party function.
- o Well-wishers-per-party function.

These distributions are produced from the field data collected for an airport.

5.3.2 MAIN Program

The distribution functions are produced for this program in the same manner as that of the auxiliary program. The following functions appear in the MAIN program.

5.3.2.1 Landside Routing Functions

- o Deplaning pax process functions (DOM/COM/INT)
- o Deplaning lobby bound process function
- o Enplaning pax process function.
- o Transfer pax process function (DOM/COM/INT).
- o Transfer out of systems function.
- o Well-wishers process functions (well-wishers left at security/gate).
- o Greeters function (greeters going to gate/lobby/bag-claim/curb).
- o Deplaning, enplaning and,deplaning curbside passengers using ground transportation.
- o Enplaning pax functions for DOM/COM/INT flights.

5.3.2.2 Service Time Functions -

- o Baggage time to bag claim area
- o Express check-in
- o Gates
- o Ticketing and Check-in
- o Customs
- o Parking
- o Car rental
- o Security
- o Curbside check-in
- o Immigration

5.3.2.3 Dwell Time Functions -

- o Vehicle unload time (enplaning curb).
- o Empty car-parking function after unload at curb.

5.3.2.4 Other Functions -

- o Greeters/party (parties with greeters only).
- o Arrival distribution (cars meeting pax).
- o Arrival distribution for greeters.
- o Number of bags (DOM/COM/INT).
- o Car rental agency selection.
- o Parking lot number assignment from airline numbers.

5.4 GPSS DATA EXAMPLES

5.4.1 REALLOCATE Statements

These statements specify the maximum number of GPSS entities which are used in the program. These cards are used in both the auxiliary and the main programs. A sample example is shown below:

REALLOCATE HMS,4,BLO,65,XAC,3500,COM,190000,

The above example indicates that the program can have a maximum of four half-word matrices (HMS), sixty-five blocks (BLO), thirty-five hundred transactions (XAC) and one hundred and ninety thousand common (COM) core allocations. Similar REALLOCATE statements are provided for additional GPSS entities.

5.4.2 RMULT Statement

This statement provides initial values for the multipliers used in GPSS-V random number generators. ALSIM utilizes random number generators 3 through 7 during program execution, thus RMULT will provide a different realization of simulated landside processes each time one or more of the C through F arguments are changed. Argument values recommended by IBM for use in this statement are 31, 37, 743 and 6352. When RMULT is not used, all initial multiplier values default to 37. Omission of a number in any argument will also provide the default value in the respective generator's initial multiplier. In the following example, random number generators 1 and 2 are left at the default value. Generators 3 through 7 are assigned other initial multiplier values:

RMULT,,743,31,31,6352,743

5.4.3 SYN and EQU Statements

SYN statements are used to specify absolute values of GPSS symbols. These symbols are later used in the mnemonic LINK function for addressing by the FORTM subprogram. EQU statements assign absolute values to GPSS entities. The starting number to be assigned to a type of landside processor is specified, followed by the total number of processors within that type. Appropriate entity symbols Q, S, L, and C designate that the processors will be represented by queues, storages, logic switches and chains respectively. These statements are used in both the AUXILIARY and MAIN programs.

In the main program, the deplaning curb storages, double parking storage and curb queues must all have the same number of

entities. The enplaning curb entities must follow the deplaning curb entities. A sample example is shown as follows:

DPCBS	SYN	44	Deplaning curb storage
DPCBS	EQU	44(6),S	Deplaning curb storage
EPCBS	SYN	50	Enplaning curb storage
EPCBS	EQU	50(6),S	Enplaning curb storage

The entity numbers specified within parentheses of EQU cards must be identical to the corresponding FACNO's of DEPLCURB and ENPLCURB cards of FORTRAN input data.

Half word and floating point matrices require SYN cards only to specify numbers of columns. The facilities: baggage-claim, express check-in, customs, immigration, parking, rent-a-car, and ticketing and check-in utilize both SYN and EQU cards. The following example illustrates the use of SYN and EQU cards for five rent-a-car and seven security facilities.

RCRQS	SYN	27	Rent-a-car Que-Sto.
RCRQS	EQU	27(5),Q,S	Rent-a-car Que-Sto.
SECQS	SYN	33	Security Que-Sto.
SECQS	EQU	33(7),Q,S	Security Que-Sto.

The variables in the first column, RCRQS and SECQS are used in the mnemonic link function. These variables are transferred to the FORTRAN section of the model from the GPSS-AUX or MAIN programs.

5.4.4 Routing Functions

The routing functions specify an order of program location to represent transaction routings. These functions are specified for domestic, commuter and international flights and apply to deplaning and enplaning passengers, well-wishers, greeters and visitors. A sample routing function is shown as follows:

```
DDP1F FUNCTION PB2,L6 Deplaning domestic pax function,
 CNCRO/,RCARO/,BAGCO/,EXITO/,CGTRO/,DEP99
```

This routing function indicates that the deplaning passenger will go to concourse, rent-a-car, baggage claim area, exit door, ground transportation and,then leave the terminal.

5.4.5 Distribution Functions

Several distribution functions are used by both the auxiliary and main GPSS programs. These distribution functions are inserted in the main body of the programs. The following type of functions are used:

5.4.5.1 Service Time Functions - These functions are used to specify the service times at the landside facilities of an airport. A sample example is shown as follows:

```
GAT3F FUNCTION RN7.C4  Gate Process Time
0.,10/.06,17/.88,47/1.0,115
```

The above function uses random number generator seven (7) and is a continuous function with four break points. The coordinates of these points are given in the next line and are extracted from the cumulative distribution plots drawn by using the field data.

The service time distribution functions for all other facilities are specified in a similar manner.

5.4.5.2 Other Distribution Functions - All other distribution functions: dwell times, greeters/party, pax/party, well-wishers/party, etc. are specified in the same way as those of service time functions.

6. MODEL OUTPUTS

ALSIM produces output data describing flow and congestion at simulated landside processing facilities. Flow and queue length data are presented as cumulative statistics and as time series. Queue time data is also produced as a set of summary statistics. Occupancy counts at landside points are produced as a time series.

The output summary data providing cumulative statistics is produced under GPSS and FORTRAN formats. GPSS formatted data is presented for storages representing service capabilities of facilities and for queues associated with these processors. The storage data represented consists of the entry count representing the demand placed upon the facility and data describing service characteristics of the processor.

An example of this storage data is exhibited in Figure 6. The storage number or name is defined by the input SYN and EQU statements. In this example, CHKQS and storages numbered two through twelve are identified with express check-in facilities. Subsequent symbols and storage numbers are associated with other simulated landside facilities.

The capacity data is obtained from FORTRAN input and represents the number of servers present at the end of the simulation period. When CHANGE cards are used during a model run, these numbers will differ from the input number appearing on the facility cards if a change is entered before program termination. Utilization statistics are also affected by CHANGE inputs and are discussed below.

The input size or capacity of enplaning and deplaning curbsides and their associated double parking spaces and queue areas are divided by the input scale factor, N, because each vehicle transaction represents N vehicles. The capacities of these facilities exhibited in the GPSS data output statistics are represented by this reduced number.

STORAGES

STORAGE	CAPACITY	AVERAGE CONTENTS	ENTRIES	AVERAGE TIME/UNIT	-AVERAGE UTILIZATION DURING- TOTAL TIME	AVAIL. TIME	UNAVAIL. TIME	CURRENT STATUS	PERCENT AVAILABILITY	CURRENT CONTENTS	MAXIMUM CONTENTS
CHQS	2	.237	17	255.235	.118				100.0		2
2	1	.229	16	262.375	.229				100.0	1	1
3	3	.169	9	342.778	.056				100.0		2
6	2	.057	4	299.750	.028				100.0		2
7	3	.106	8	242.000	.035				100.0		3
8	4	.389	28	254.143	.097				100.0		4
11	10	3.385	241	257.066	.338				100.0	1	10
12	3	.214	12	325.750	.071				100.0		3
LARQS	2	.684	254	49.295	.342				100.0	2	2
22	2	.393	143	50.329	.196				100.0	2	2
23	4	1.268	451	51.466	.317				100.0	4	4
HCRQS	2	.922	32	527.250	.460				100.0	2	2
28	2	.983	34	529.323	.491				100.0	2	2
29	2	1.062	40	485.725	.530				100.0	2	2
30	2	.985	35	514.857	.492				100.0	2	2
31	2	.909	33	504.333	.454				100.0	2	2
CLSHS	10	4.059	400	185.640	.405				100.0	10	10
SECQS	1	.377	542	12.742	.377				100.0		1
36	2	.508	469	19.834	.254				100.0		2
37	1	.307	256	21.914	.306				100.0		1
38	1	.353	355	18.194	.352				100.0	1	1
39	1	.301	225	24.489	.301				100.0		1
40	2	.738	657	20.557	.369				100.0	2	2
41	1	.522	450	21.209	.521				100.0		1
TPMQS	16	6.805	490	254.139	.425				100.0	9	16
DICBS	20	4.947	43	2105.256	.247				100.0	9	15
45	10	4.843	34	2606.912	.484				100.0	10	10
46	15	8.393	53	2897.962	.559				100.0	15	15
47	15	8.198	71	2113.098	.546				100.0	11	15
48	10	4.276	35	2235.943	.427				100.0	10	10
49	15	8.081	62	2385.064	.538				100.0	15	15
EPCBS	18	2.348	142	302.584	.130				100.0	5	8
51	9	1.890	99	350.809	.210				100.0	2	9
52	5	1.338	23	1064.348	.267				100.0	3	5
53	5	1.422	64	406.656	.284				100.0	1	5
54	5	2.196	70	574.043	.439				100.0	4	5
55	10	4.166	118	646.017	.416				100.0	8	10
57	1	.292	22	243.273	.292				100.0	1	1
58	1	.298	28	194.679	.297				100.0	1	1
59	1	.277	31	163.452	.276				100.0		1
60	1	.126	13	177.538	.126				100.0	1	1
61	1	.414	48	157.854	.414				100.0	1	1
64	1	.044	4	203.500	.044				100.0		1
65	1	.114	7	299.286	.114				100.0		1
66	1	.199	16	227.437	.198				100.0		1

FIGURE 6. GPSS STORAGE OUTPUT

67	1	.152	12	231.500	.151	100.0		1
69	1	.107	17	201.353	.187	100.0		1
70	1	.237	23	180.478	.236	100.0	1	1
71	1	.219	23	173.913	.218	100.0		1
72	1	.085	7	221.000	.084	100.0		1
73	1	.255	38	122.947	.255	100.0		1
GAOSL	2	.687	117	107.419	.343	100.0		2
81	2	.891	186	87.656	.445	100.0		2
83	2	.444	73	111.192	.221	100.0		2
84	2	.656	121	99.248	.328	100.0	1	2
85	2	.344	46	136.804	.171	100.0		2
87	2	.263	36	133.528	.131	100.0		2
88	2	.277	42	120.667	.138	100.0		2
89	2	.206	33	114.091	.102	100.0		2
90	2	.394	66	109.227	.196	100.0		2
91	2	.433	73	108.452	.216	100.0		2
92	2	.328	42	142.762	.163	100.0		2
93	2	.227	38	109.368	.113	100.0	1	2
96	2	.220	38	105.789	.109	100.0		2
97	2	.223	27	150.852	.111	100.0		2
98	2	.419	73	105.027	.209	100.0		2
99	2	.137	20	124.900	.068	100.0		2
100	2	.026	3	156.667	.012	100.0		1
101	2	.071	7	185.143	.035	100.0		2
102	2	.175	22	145.682	.087	100.0	2	2
103	2	.040	4	185.250	.020	100.0		2
104	2	.323	74	80.000	.161	100.0	2	2
107	2	.201	22	167.000	.100	100.0		2
113	2	.017	2	158.000	.008	100.0		1
114	2	.134	20	122.750	.067	100.0		2
115	2	.228	32	130.406	.114	100.0	2	2
116	2	.199	31	117.419	.099	100.0		2
117	2	.119	15	145.667	.059	100.0	2	2
120	2	.333	50	121.880	.166	100.0		2
121	2	.035	6	106.000	.017	100.0		2
123	2	.002	1	43.000	.001	100.0		1
124	2	.120	23	95.478	.060	100.0	1	2
126	2	.135	13	190.000	.067	100.0		2
127	2	.121	13	170.154	.060	100.0	2	2
129	2	.434	50	158.840	.216	100.0		2
131	2	.251	23	200.043	.125	100.0		2
133	2	.281	32	160.781	.140	100.0		2
134	2	.387	50	141.800	.193	100.0		2
139	2	.150	27	101.667	.075	100.0		2
140	2	.323	60	98.400	.161	100.0		2
141	2	.168	33	93.182	.084	100.0		2
142	2	.039	6	119.167	.019	100.0		1
144	2	.232	35	121.200	.115	100.0		2
146	2	.457	43	194.626	.228	100.0		2

FIGURE 6. GPSS STORAGE OUTPUT (CONT'D)

147	2	.198	25	144.720	.098	100.0		2
148	2	.360	43	153.372	.180	100.0		2
150	2	.970	132	134.508	.485	100.0	2	2
151	2	.391	56	127.821	.195	100.0		2
152	2	.148	15	180.133	.073	100.0		2
154	2	.478	86	101.802	.239	100.0		2
155	2	.365	60	111.233	.182	100.0	1	2
159	2	.262	28	171.250	.131	100.0		2
160	2	.249	34	134.206	.124	100.0		2
161	2	.258	[illegible]	168.321	.128	100.0		2
162	2	.125	25	91.480	.062	100.0		2
163	2	.274	43	116.651	.137	100.0		2
165	2	.033	6	101.167	.016	100.0		1
168	2	.270	45	109.778	.134	100.0	2	2
170	2	.651	86	138.453	.325	100.0	2	2
171	2	.541	78	126.885	.270	100.0		2
172	2	.261	26	183.577	.130	100.0	1	2
173	2	.402	71	103.718	.201	100.0	1	2
174	2	.284	29	179.069	.141	100.0		2
176	2	.049	8	112.125	.024	100.0		2
177	2	.310	35	161.914	.154	100.0	2	2
178	2	.123	32	70.406	.061	100.0	1	2
180	2	.143	39	67.000	.071	100.0		2
181	2	.235	38	113.026	.117	100.0		2
184	2	.042	4	193.000	.021	100.0		2
185	14	3.439	252	249.770	.245	100.0	2	14
186	3	.311	22	258.591	.103	100.0		4
187	8	.790	58	249.207	.098	100.0		5
188	3	.459	33	254.485	.152	100.0		4
189	6	1.581	126	229.595	.263	100.0	2	6
190	2	.230	18	233.944	.115	100.0		2
191	3	2.087	154	247.961	.695	100.0	3	7
192	4	2.225	120	339.325	.556	100.0		6
193	4	.801	53	276.660	.200	100.0		7
194	7	1.075	59	333.356	.153	100.0	2	5
195	13	3.768	280	246.246	.289	100.0	2	14
196	23	1.498	111	246.910	.065	100.0	1	10
198	8	1.148	95	221.053	.143	100.0	2	8
199	2	1.467	103	260.583	.733	100.0	2	2

FIGURE 6. GPSS STORAGE OUTPUT (CONT'D)

The average contents of the storage indicate the average number of GPSS transactions in simulated service during the model run. This is an indication of the degree of activity at the facility during these periods.

The number of entries exhibited is the number of GPSS transactions entering the storage. For landside facilities within the terminal building, this value represents the number of passenger groups utilizing the facility, divided by the scale factor. For landside facilities processing vehicles, such as the curbside or parking exit, this entry count represents the number of vehicles entering the facility, divided by the scale factor.

With the exception of security, the average time per unit represents the average service time per passenger group for processing facilities or average dwell time at a curbside. The value is an estimate of the mean value of the input service or dwell time distribution. The calculation of this statistic is based upon samples of the distribution drawn by random numbers generated during a simulation run. At security, this service time is the average service time per person.

Average utilization during the total time is the quotient produced by dividing the average contents by the capacity. When a processor is modeled without the use of a CHANGE card to update the number of servers, this utilization statistic is applicable for a determination of the loading of the facility. CHANGE card data applied to a facility produce an erroneous statistic because the capacity value at run termination is used in the calculation of utilization and may not be representative of the average capacity.

These landside facilities are modeled as available for service throughout the simulation period. For most facilities, this is an accurate representation of terminal operations during a busy period. However, this representation is also applied to gate counters and is not necessarily representative of normal gate activity. If queueing and service processes for gate counter

operation require investigation, CHANGE card data must be entered, or a program modification to permit gate availability only near departure times must be performed.

The current and maximum contents of the storage are produced at the end of the simulation period. These are presented as numbers of transactions for each quantity.

Queue information is also produced under GPSS format. An example of this queue output data is shown in Figure 7. The data format is similar to that produced for GPSS storages, except that the entry counts are enumerated by person, divided by the scale factor. Thus, for example, the total queue entries of the check-in facility CHKQS are nearly twice those of the corresponding queue entries. The passenger groups using this facility have an average size of approximately two persons. ALSIM assumes that passengers and visitors join the queue for this and other landside services. The transaction parameter, PB5, the number of persons, including passengers and visitors, in the group, is used to increment queue entry counts except at the parking facility exit. The average time per transaction should be interpreted as the average time per person spent in the queue.

Queueing of vehicles at curbsides is represented by use of storage instead of queues. This feature is intended to limit the maximum queue size to the value specified by the CURBQ parameter of the ENPLCURB and DEPLCURB input cards. The storages designated by EQU statements in this particular example are numbered between 68 and 79. The number of vehicles queueing at the curbside sections is given by the entry counts multiplied by the scale factor. The average time spent queueing is provided by the AVERAGE TIME/UNIT column. The input capacity, CURBQ, has been divided by the scale factor to obtain the capacity shown in Figure 6.

Data representing waiting time at bag claim is produced as USER CHAIN output. The numbers and name reserved for these entities are defined by SYN and EQU statements of the MAIN program. USER CHAIN output also provides data for lengths of time spent

QUEUES

QUEUE	MAXIMUM CONTENTS	AVERAGE CONTENTS	TOTAL ENTRIES	ZERO ENTRIES	PERCENT ZEROS	AVERAGE TIME/TRANS	$AVERAGE TIME/TRANS	TABLE NUMBER	CURRENT CONTENTS
CIHRS	4	.031	33	26	78.7	17.303	81.571		
2	6	.296	29	13	44.8	187.068	339.062		
3	2	.000	12	12	100.0	.000	.000		
6	4	.000	7	7	100.0	.000	.000		
7	5	.000	15	15	100.0	.000	.000		
8	6	.000	66	66	100.0	.000	.000		
11	14	.273	459	370	80.6	16.693	56.179		
12	4	.019	23	19	82.6	15.565	89.500		
PARDS	16	.768	255	91	35.6	55.145	85.743		1
22	3	.077	144	107	74.3	9.868	38.405		1
23	12	.435	453	287	63.3	17.600	48.030		2
ICHOS	28	4.685	59	7	11.8	1453.220	1648.845		27
28	23	5.278	55	5	9.0	1756.181	1931.799		21
29	45	8.323	85	5	5.8	1792.082	1904.087		45
30	24	4.460	59	6	10.1	1383.593	1540.226		24
31	23	5.264	55	8	14.5	1751.527	2049.659		22
CUSOS	112	16.824	741		.0	415.496	415.496		101
SFCOS	34	2.446	781	257	32.9	57.325	85.440		
36	10	.180	770	550	71.4	4.283	14.990		
37	8	.340	435	260	59.7	14.335	35.634		
38	21	1.937	599	136	22.7	61.036	78.965		16
39	12	.564	449	247	55.0	23.022	51.173		
40	35	1.432	1167	563	48.2	22.463	43.402		2
41	147	24.406	807	104	12.8	553.459	635.336		
TMMOS	171	23.327	772		.0	552.963	552.963		
CREW	1	.000	81	81	100.0	.000	.000		
44	1	.000	707	707	100.0	.000	.000		
45	1	.000	300	300	100.0	.000	.000		
46	1	.000	226	226	100.0	.000	.000		
47	1	.000	136	136	100.0	.000	.000		
48	1	.000	92	92	100.0	.000	.000		
50	1	.000	414	414	100.0	.000	.000		
51	1	.000	315	315	100.0	.000	.000		
52	1	.000	288	288	100.0	.000	.000		
53	1	.000	216	216	100.0	.000	.000		
54	1	.000	130	130	100.0	.000	.000		
GAUSL	19	.647	117	46	39.3	101.205	166.774		
81	45	6.114	186	39	20.9	601.618	761.231		
83	12	.909	73	35	47.9	227.931	437.868		
84	24	1.472	121	61	50.4	222.652	449.016		
85	8	.298	46	19	41.3	118.565	202.000		
87	[illegible]	.031	36	25	69.4	16.111	52.727		
88	1	.001	42	38	90.4	.785	8.250		
89	1	.017	33	27	81.8	9.848	54.166		
90	3	.079	66	44	66.6	22.151	66.454		
91	8	.314	73	34	46.5	78.798	147.887		
92	3	.034	42	34	80.9	14.857	78.000		

FIGURE 7. GPSS QUEUE OUTPUT

95	1	.000	38	38	100.0	.000	.000	
96	1	.000	38	37	97.3	.421	16.000	
97	3	.049	27	22	81.4	33.370	180.199	
98	4	.081	73	53	72.6	20.438	74.599	
99	2	.009	20	18	69.9	8.799	88.000	
100	1	.000	3	3	100.0	.000	.000	
101	1	.000	7	7	100.0	.000	.000	
102	1	.002	22	20	90.9	2.272	25.000	
103	1	.000	4	4	100.0	.000	.000	
104	19	.798	76	22	28.9	192.302	270.647	2
107	1	.000	22	21	95.4	.500	11.000	
113	1	.000	2	2	100.0	.000	.000	
114	2	.025	20	15	75.0	23.250	93.000	
115	1	.002	32	30	93.7	1.687	27.000	
116	1	.010	31	26	83.8	6.000	37.199	
117	1	.000	15	14	93.3	.133	2.000	
120	5	.152	50	26	51.9	55.979	116.625	
121	1	.000	6	6	100.0	.000	.000	
123	1	.000	1	1	100.0	.000	.000	
124	4	.016	23	18	78.2	13.043	60.000	
126	1	.000	13	13	100.0	.000	.000	
127	5	.022	17	10	58.8	24.058	58.428	4
129	11	.603	50	18	35.9	221.039	345.375	
131	5	.089	23	15	65.2	71.521	205.625	
133	2	.016	32	25	78.1	9.250	42.285	
134	3	.029	50	43	85.9	10.899	77.857	
139	3	.037	27	19	70.3	25.407	85.750	
140	5	.119	60	34	56.6	36.416	84.038	
141	3	.035	33	24	72.7	19.636	72.000	
142	1	.000	6	6	100.0	.000	.000	
144	1	.007	35	32	91.4	3.685	43.000	
146	3	.081	43	28	65.1	34.488	98.866	
147	1	.002	25	23	91.9	1.719	21.500	
148	8	.464	43	15	34.8	197.883	303.892	
150	11	1.566	140	35	25.0	204.757	273.009	8
151	3	.049	56	43	76.7	16.321	70.307	
152	1	.000	15	15	100.0	.000	.000	
154	5	.233	86	40	46.5	44.767	93.043	
155	8	.344	60	35	58.3	105.183	252.439	
159	2	.029	28	25	89.2	19.000	177.333	
160	2	.004	34	30	88.2	2.176	18.500	
161	1	.002	28	26	92.8	1.642	23.000	
162	1	.004	25	23	91.9	3.599	45.000	
163	3	.038	43	34	79.0	17.325	78.000	
165	1	.000	6	6	100.0	.000	.000	
168	2	.030	45	39	86.6	12.466	93.500	
170	6	.195	86	52	60.4	41.581	105.176	
171	5	.300	78	29	37.1	70.564	112.326	
172	1	.012	26	21	80.7	9.076	47.199	
173	6	.249	71	46	64.7	64.366	182.799	
174	1	.009	29	26	89.6	6.310	61.000	

FIGURE 7. GPSS QUEUE OUTPUT (CONT'D)

176	1	.001	8	7	87.5	4.000	32.000	
177	1	.017	36	28	77.7	8.790	39.375	1
178	5	.039	32	25	78.1	22.625	103.428	
180	6	.113	39	13	33.3	53.256	79.884	
181	1	.001	38	35	92.1	.710	9.000	
184	1	.000	4	4	100.0	.000	.000	
TILOS	17	.155	537	474	88.2	5.307	45.238	
186	12	.246	41	26	63.4	109.829	300.199	
187	6	.023	96	88	91.6	4.385	52.625	
188	7	.052	60	51	84.9	16.149	107.666	
189	11	.102	273	235	86.0	7.849	49.210	
190	5	.018	30	27	89.9	11.533	115.333	
191	21	1.890	343	208	60.6	100.842	256.214	17
192	27	1.251	263	138	52.4	87.098	183.255	
193	6	.000	106	106	100.0	.000	.000	
194	6	.000	132	132	100.0	.000	.000	
195	6	.012	556	544	97.8	.406	18.833	
196	6	.000	233	233	100.0	.000	.000	
198	6	.000	173	172	99.4	.104	18.000	
199	17	4.318	194	27	13.9	407.391	473.257	9

$AVERAGE TIME/TRANS = AVERAGE TIME/TRANS EXCLUDING ZERO ENTRIES

FIGURE 7. GPSS QUEUE OUTPUT (CONT'D)

waiting by transactions simulating the meeting of passengers and greeters and waiting times for buses.

An example of USER CHAIN output is shown in Figure 8. USER CHAIN numbers 1(equal to CHA1B) through 55(equal to CHA2B) have been reserved for bag claim simulation. The transaction representing an arriving flight selects the lowest numbered available chain within these limits and retains the passenger waiting for bags on the selected chain. Chain numbers therefore, are not related to specific bag claim devices but only provide a summarized report of numbers of passengers waiting.

The numbers of passengers or greeters waiting at the gate, bag claim or lobby are held on chains named GREGC, GREBC and GRELC respectively. These represent the passenger or visitor not immediately able to be matched with the respective counterpart. The chain DPL1C contains vehicles waiting at the curbside for their respective terminating passengers. The chain DPL2C is used to retain terminating passengers awaiting vehicles for pick up at the deplaning curbside.

The chain EBUSC contains originating enplaning passengers collected and held until an arriving bus transaction releases them. This release simulates the arrival of the bus at the enplaning curb.

The number of entries and average time per transaction are available for these entities. The entry counts represent passenger groups or vehicles, both divided by the scale factor.

GPSS also produces tables of queuing time for each simulation hour. At each landside facility, the total time spent in a queue by a passenger transaction is accumulated in the transaction parameter PH11. When the transaction is terminated, either by simulated boarding of a departing aircraft or leaving the airport landside via a ground transportation mode, the total landside queueing time is recorded.

The recorded total queueing time of all passenger transactions terminated within the simulated hour forms a cumulative distribution

USER CHAINS

USER CHAIN	TOTAL ENTRIES	AVERAGE TIME/TRANS	CURRENT CONTENTS	AVERAGE CONTENTS	MAXIMUM CONTENTS
CHAIB	120	419.691		2.752	41
2	118	474.384		3.060	31
3	173	495.913		4.698	30
4	114	263.264		1.675	25
5	143	283.587		2.216	35
6	87	136.983		.651	21
7	117	138.641		.886	33
8	73	299.358	16	1.196	24
9	64	309.203		1.081	13
10	83	311.554	31	1.413	41
11	1	17.000		.000	1
12	43	271.558		.638	31
13	57	139.701		.435	29
14	12	606.916		.397	12
15	3	68.333		.011	3
16	7	392.714		.150	7
18	10	574.500		.313	10
GREGC	87	2202.942	37	10.473	38
GREBC	665	2731.186	234	99.248	252
GRELC	80	5721.921	72	25.013	72
DPL1C	359	2134.635	77	41.876	89
DPL2C	240	2068.895	106	27.133	108
DPL3C	106	2486.915	44	14.405	47
EBUSC	367	293.563	1	5.887	28

FIGURE 8. GPSS USER CHAIN OUTPUT

produced by GPSS. An example of this table is shown in Figure 9. The total number of terminated transactions is shown as ENT ..S IN TABLE. The mean queueing time is shown as MEAN ARGUMENT and the STANDARD DEVIATION is exhibited. The SUM of ARGUMENTS is the total of all queueing time for the transaction terminated during the hour.

UPPER LIMIT times are in seconds and the number of transactions sustaining a delay between the time shown in the UPPER LIMIT and the next lower value is exhibited as the OBSERVED FREQUENCY. The other table columns are obtained from these frequencies and the total table entries.

A table of passenger walking times, PAXWT, is also produced. This is obtained from the simulated passenger walking time accumulated in the transaction parameter PH9. This parameter is incremented each time the transaction proceeds to the next facility designated by the assigned routing function. At transaction termination, the cumulative walking time contained in PH9 is entered into the table.

The GPSS storage and queue information is reformatted by FORTM and produced under FORTRAN format control. Summaries are presented for several facility types and are titled from descriptions input on RUNTITLE cards. An example of an express check-in facility report is shown in Figure 10. The facility numbers correspond to the FACNO values of the CHECKIN cards. Facility utilization statistics are obtained from GPSS storage data. The number of agents is obtained directly from the GPSS capacity. The total number of patrons is expressed as numbers of passenger groups and is obtained by multiplying the number of GPSS entries by the input scale factor. The maximum number of agents busy is obtained from the maximum contents and the average number of agents busy is obtained by taking the product of the GPSS capacity and average utilization. CHANGE card data, affecting the operation of the designated facilities, will invalidate agent output data as explained in the GPSS storage output description. The average time per patron is obtained by dividing the scale factor into the GPSS

TABLES

TABLE HOUR3

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
148	166.669	334.000	24670.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
100	110	74.32	74.3	25.6	.599	-.199
200	4	2.70	77.0	22.9	1.199	.099
300	3	2.02	79.0	20.9	1.799	.399
400	10	6.75	85.8	14.1	2.399	.698
500	1	.67	86.4	13.5	2.999	.997
600	1	.67	87.1	12.8	3.599	1.297
700	3	2.02	89.1	10.8	4.199	1.596
800	2	1.35	90.5	9.4	4.799	1.896
900	5	3.37	93.9	6.0	5.399	2.195
1000	1	.67	94.5	5.4	5.999	2.494
1100	1	.67	95.2	4.7	6.599	2.794
1200	5	3.37	98.6	1.3	7.199	3.093
1300	0	.00	98.6	1.3	7.798	3.393
1400	1	.67	99.3	.6	8.398	3.692
1500	1	.67	100.0	.0	8.998	3.991

REMAINING FREQUENCIES ARE ALL ZERO

TABLE PAXWT

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
3477	444.948	343.000	1547087.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
100	103	2.96	2.9	97.0	.224	-1.005
200	456	13.11	16.0	83.9	.449	-.714
300	870	25.02	41.0	58.9	.674	-.422
400	788	22.66	63.7	36.2	.898	-.131
500	264	7.59	71.3	28.6	1.123	.160
600	286	8.22	79.5	20.4	1.348	.452
700	237	6.81	86.3	13.6	1.573	.743
800	134	3.85	90.2	9.7	1.797	1.035
900	25	.71	90.9	9.0	2.022	1.326
1000	20	.57	91.5	8.4	2.247	1.618
1100	49	1.40	92.9	7.0	2.472	1.909
1200	55	1.58	94.5	5.4	2.696	2.201
1300	80	2.30	96.8	3.1	2.921	2.492
1400	62	1.78	98.6	1.3	3.146	2.784
1500	0	.00	98.6	1.3	3.371	3.075
1600	3	.08	98.7	1.2	3.595	3.367
1700	2	.05	98.7	1.2	3.820	3.659
1800	1	.02	98.7	1.2	4.045	3.950
1900	5	.14	98.9	1.0	4.270	4.242
OVERFLOW	37	1.06	100.0	.0		
AVERAGE VALUE OF OVERFLOW		2220.94				

FIGURE 9. GPSS WAITING TIME DISTRIBUTION

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALED
MODEL DATA 03/18/1978

EXPRESS CHECKIN FACILITY REPORT

	FACILITY UTILIZATION					QUEUE STATISTICS			
FACILITY NUMBER	NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	2	34	2	0.24	2: 7	56	8	0.06	0:17
2	1	32	1	0.22	2: 5	58	12	0.59	3: 7
~~5~~	~~5~~	~~18~~	~~2~~	~~0.17~~	~~2:51~~	~~24~~	~~4~~	~~0.0~~	~~0: 0~~
6	2	8	2	0.06	2: 9	14	8	0.0	0: 0
7	3	16	3	0.11	2: 1	30	10	0.0	0: 0
~~8~~	~~4~~	~~56~~	~~4~~	~~0.39~~	~~2: 7~~	~~132~~	~~12~~	~~0.0~~	~~0: 0~~
11	10	482	10	3.38	2: 8	918	28	0.55	0:10
12	3	24	3	0.21	2:42	46	8	0.04	0:15

(ALL TIMES IN MINUTES:SECONDS)

FIGURE 10. EXPRESS CHECK-IN FACILITY REPORT

average time per unit. This is required because a GPSS variable was used to multiply the randomly selected sample from input distribution of service time per passenger group and the input scale factor to obtain a service time for each transaction.

Queue statistics are obtained from the GPSS queue output. The total queue entries are the product of the total entries column and the scale factor. This quantity provides the total number of persons in the queue including all passengers and visitors. The maximum and average queue size are the maximum contents and zero entries, respectively. Both are multiplied by the scale factor. The average time in the queue is the average time per transaction from GPSS. This is an average waiting time of all queue entries, including zero wait time entries, converted to minutes and seconds. Data is also presented in this format for Ticketing and Check-in, Figure 11, Security, Figure 12, Customs, Figure 13, Immigration, Figure 14, Car Rental Counters, Figure 15, and Boarding Gates, Figure 16.

Time series data for flow, the count of persons or vehicles discharged through a facility every five minutes, and queue length, the instantaneous count of persons or vehicles in queue at a facility at each five minute mark are provided by ALSIM. These data are provided for by GPSTO, GPQUE and GPHALF data input statements. An example of this output is shown as Figure 17. The numbers 1 through 24 refer to the position of the entry on the data input cards. For example, if the input data cards were as follows:

```
TIMESERIES     GPSTO = 23, 22, 19...............
TIMESERIES     GPQUE = 23, 22, 186, 188, 191....
TIMESERIES     GPHALF = 33, 28, 24, 20..........
```

The corresponding data for storage 23 would be in column numbered 1, for storage 22 in column numbered 2 and for storage 19 column numbered 3. The GPQUE and GPHALF data uses the same ordering sequence.

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALFD
MODEL DATA 03/18/1978

TICKETING & CHECKIN FACILITY REPORT

FACILITY NUMBER	FACILITY UTILIZATION: NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	QUEUE STATISTICS: TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	14	504	14	3.43	2: 4	1074	34	0.31	0: 5
2	3	44	4	0.31	2: 9	82	24	0.49	1:49
3	8	116	5	0.79	2: 4	192	12	0.05	0: 4
4	3	66	4	0.46	2: 7	120	14	0.11	0:16
5	6	252	6	1.58	1:54	546	22	0.20	0: 6
6	2	36	2	0.23	1:56	60	10	0.04	0:11
7	3	300	7	2.08	2: 3	686	42	3.76	1:40
8	4	240	6	2.23	2:49	526	54	2.50	1:27
9	4	106	7	0.80	2:18	212	12	0.0	0: 0
10	7	118	5	1.07	2:46	264	12	0.0	0: 0
11	13	560	14	3.76	2: 3	1112	12	0.02	0: 0
12	23	222	10	1.50	2: 3	466	12	0.0	0: 0
13	8	0	0	0.0	0: 0	0	0	0.0	0: 0
14	6	190	8	1.14	1:50	346	12	0.00	0: 0
15	2	206	2	1.05	2: 9	388	34	8.52	6:41

FIGURE 11. TICKETING AND CHECK-IN FACILITY REPORT

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
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MODEL DATA 03/18/1978

SECURITY FACILITY REPORT

	FACILITY UTILIZATION					QUEUE STATISTICS			
FACILITY NUMBER	NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	1	1084	1	0.38	0: 6	1562	68	4.89	0:57
2	2	938	2	0.51	0: 9	1540	20	0.36	0: 4
3	1	512	1	0.31	0:10	870	16	0.68	0:14
4	1	710	1	0.35	0: 9	1198	42	3.99	1: 0
5	1	450	1	0.30	0:12	898	24	1.13	0:23
6	2	1314	2	0.74	0:10	2334	70	2.86	0:22
7	1	900	1	0.52	0:10	1614	294	48.81	9:13

(ALL TIMES IN MINUTES:SECONDS)

FIGURE 12. SECURITY FACILITY REPORT

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALED
MODEL DATA 03/18/1978

CUSTOMS FACILITY REPORT

FACILITY UTILIZATION						QUEUE STATISTICS			
FACILITY NUMBER	NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	10	800	10	4.05	1:32	1482	224	33.59	6:54

(ALL TIMES IN MINUTES:SECONDS)

FIGURE 13. CUSTOMS FACILITY REPORT

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALED
MODEL DATA 03/18/1978

IMMIGRATION FACILITY REPORT

FACILITY UTILIZATION						QUEUE STATISTICS			
FACILITY NUMBER	NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	16	980	16	6.80	2: 7	1544	322	46.65	9:12

(ALL TIMES IN MINUTES:SECONDS)

FIGURE 14. IMMIGRATION FACILITY REPORT

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALED
MODEL DATA 03/18/1978

CAR RENTAL AGENCY FACILITY REPORT

FACILITY UTILIZATION						QUEUE STATISTICS			
FACILITY NUMBER	NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	2	64	2	0.92	4:22	118	56	9.23	23:51
2	2	68	2	0.96	4:19	110	46	10.15	28: 9
3	2	80	2	1.05	4: 0	170	90	16.37	29:22
4	2	70	2	0.94	4: 5	118	48	8.63	22:18
5	2	66	2	0.89	4: 7	110	46	10.17	28:11

(ALL TIMES IN MINUTES:SECONDS)

FIGURE 15. RENTAL CAR COUNTERS FACILITY REPORT

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCAFFU
MODEL DATA 03/18/1978

BOARDING GATE FACILITY REPORT

FACILITY UTILIZATION						QUEUE STATISTICS			
FACILITY NUMBER	NO. OF AGENTS	TOTAL NO. OF PATRONS	MAX. NO. OF AGENTS BUSY	AVG. NO. OF AGENTS BUSY	AVG. TIME PER PATRON	TOTAL QUEUE ENTRIES	MAX. QUEUE SIZE	AVG. QUEUE SIZE	AVG. TIME IN QUEUE
1	2	234	2	0.69	0:53	234	28	1.29	1:41
2	2	372	2	0.89	0:43	372	90	12.23	10: 1
3	2	0	0	0.0	0: 0	0	0	0.0	0: 0
4	2	146	2	0.44	0:55	146	24	1.82	3:47
5	2	242	2	0.65	0:49	242	48	2.94	3:42
6	2	92	2	0.39	1: 0	92	16	0.60	1:50
7	2	0	0	0.0	0: 0	0	0	0.0	0: 0
8	2	72	2	0.26	1: 6	72	6	0.06	0:16
9	2	84	2	0.28	1: 0	84	2	0.00	0: 0
10	2	66	2	0.21	0:57	66	2	0.04	0: 9
11	2	132	2	0.39	0:54	132	6	0.16	0:22
12	2	146	2	0.43	0:54	146	16	0.63	1:18
13	2	84	2	0.33	1:11	84	6	0.07	0:14
14	2	76	2	0.23	0:54	76	2	0.0	0: 0
15	2	0	0	0.0	0: 0	0	0	0.0	0: 0
16	2	0	0	0.0	0: 0	0	0	0.0	0: 0
17	2	76	2	0.22	0:52	76	2	0.00	0: 0
18	2	54	2	0.22	1:15	54	6	0.10	0:33
19	2	146	2	0.42	0:52	146	8	0.16	0:20
20	2	40	2	0.14	1: 2	40	4	0.02	0: 8

FIGURE 16. BOARDING GATE FACILITY REPORT

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALED
MODEL DATA 03/18/1978

5 MINUTE SNAPSHOTS

CLOCK TIME	POINT 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1100	12	6	0	0	0	0	32	2	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	24	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	126	130	80	2	76	70	70																	
	64	8	0	0	36	0	24	48	2	8	148	0	0	0	62									
1105	6	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	8	0	0	0	6	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26	10	20	0	10	8	8																	
	14	0	0	0	6	0	0	6	0	6	26	4	0	0	0									
1110	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	26	0	0	14	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	44	32	18	4	14	28	4																	
	2	0	10	0	6	0	18	36	0	0	16	0	0	0	18									
1115	8	0	2	0	0	0	6	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	52	0	0	16	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30	22	10	0	38	18	12																	
	2	0	0	0	6	0	6	6	0	0	14	0	0	0	12									
1120	2	0	2	0	8	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	56	0	0	22	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	56	20	6	0	12	6	20																	
	18	0	2	4	8	0	8	6	0	0	26	0	0	4	12									
1125	12	4	0	0	2	0	12	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	4	0	0	0	0	8	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	0	2	0	0	14	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	78	16	24	8	36	26	12																	
	8	0	0	0	6	0	0	18	0	14	18	0	0	0	24									
1130	14	2	8	0	6	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	12	0	0	26	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	20	20	12	26	36	18																	
	22	4	6	0	16	0	30	16	2	2	46	18	0	0	14									
1135	12	2	0	0	6	0	6	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	4	0	2	0	0	0	0	12	0	0	0	0	0	6	0	0	0	0	0	0	0	0
	0	0	0	0	14	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	32	34	24	2	36	40	26																	
	14	0	2	0	34	0	24	22	2	6	48	0	0	4	4									

FIGURE 17. TIME SERIES OUTPUT, FLOW AND QUEUE LENGTH

At each clock time, appearing in the left hand column of the page, the value produced by the entities is exhibited. The GPSTO row is first, followed by GPQUE and GPHALF respectively. The fourth row is the outflow from the concourse security stations obtained from halfword matrix 11 and the fifth row is the number of persons processed by the full service ticket counters and stored in halfword matrix 13. All data is exhibited in terms of persons or vehicles. If GPSTO is used, the program will only produce vehicle or passenger group counts.

The flow counts produced for the first five minute time interval are the cumulative counts from the start of the program until the time designated. All succeeding time intervals provide five minute flow counts.

A graphical plot produced by performing five ALSIM runs with a different random number stream for each replication is exhibited in Figure 18. This data is produced by storing the time series data from each run and averaging the flow count at each time point. Data observed at the airport for a time period corresponding to the input flight schedule is shown for comparison. Queue length data corresponding to the same time period is displayed in Figure 19.

Occupancy data, the count of persons at each input point designated on the facility cards is shown in Figure 20. These are instantaneous counts of persons at the times designated in the time column appearing at the left of the page.

A sumary of available ALSIM output data is presented in Table 2. Time series of flow, counted by person, are generally obtained by designation of a specific halfword savevalue by the EQU statement, inserted in the GPSS MAIN program where applicable and referenced by a TIMESERIES GPHALF data entry. Specific halfwords inserted in the program for reference are the following:

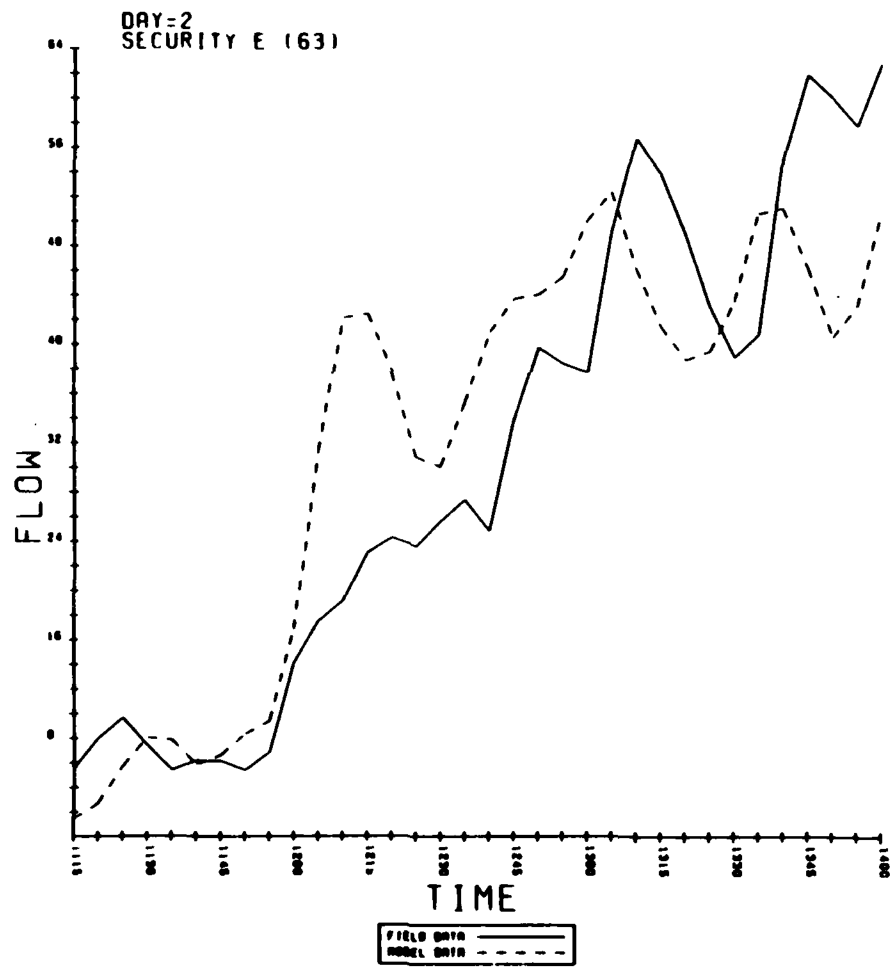


FIGURE 18. MIAMI CONCOURSE E SECURITY STATION FLOW

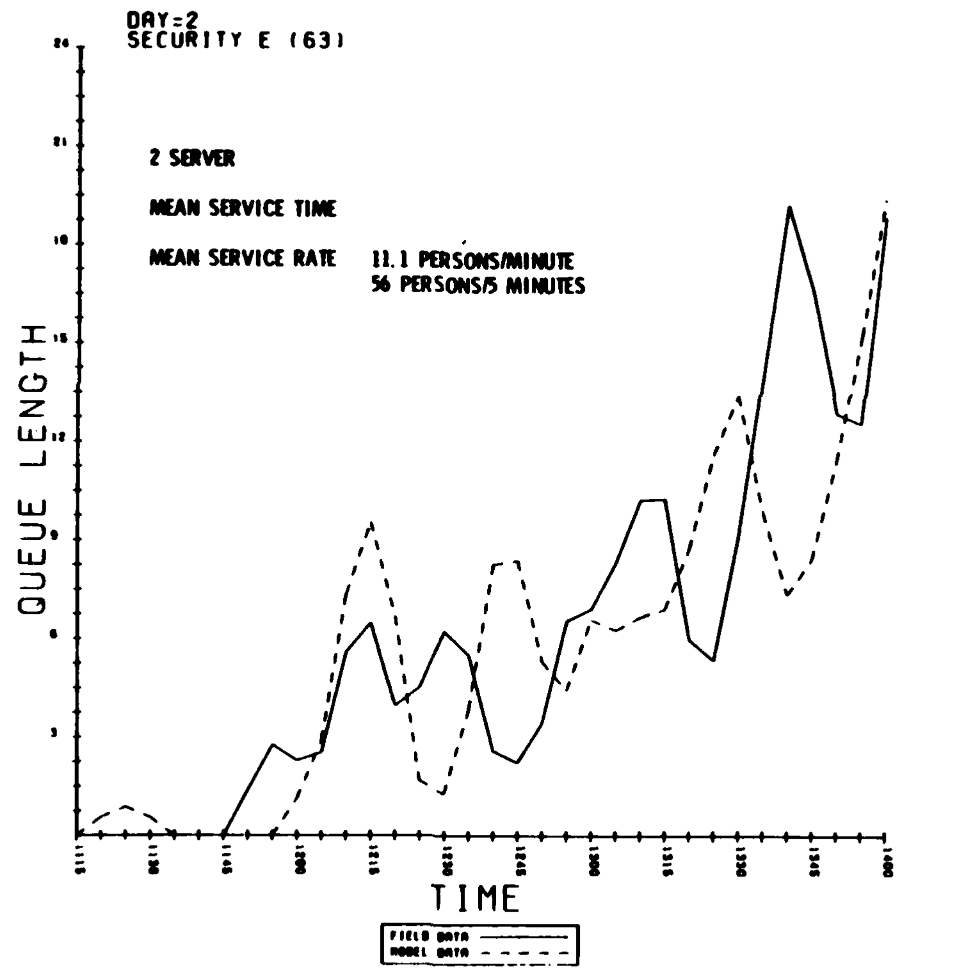


FIGURE 19. MIAMI CONCOURSE E SECURITY STATION QUEUE LENGTH

MIAMI INTERNATIONAL AIRPORT
CONCOURSE A TO H (ALL)
SCALED
MODEL DATA 03/18/1978

5 MINUTE SNAPSHOTS OF CONGESTION AT POINTS

CLOCK TIME	POINT 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1100	12	0	0	0	0	0	0	18	0	10	16	32	0	0	0	0	0	4	0	0	0	0	0	0
1105	2	0	10	0	4	0	14	38	0	16	26	20	12	0	0	0	8	0	2	0	0	0	0	0
1110	8	0	0	0	6	0	6	6	0	10	14	20	4	0	0	0	12	0	0	0	0	0	0	0
1115	12	4	2	4	0	0	0	4	0	38	22	6	30	0	0	0	0	0	0	0	0	0	0	0
1120	8	0	4	0	6	0	14	24	2	40	10	24	50	0	0	0	4	8	0	0	0	0	0	0
1125	22	8	4	0	16	0	26	42	2	26	58	34	12	0	8	0	4	0	4	0	0	0	0	0
1130	22	4	2	0	20	0	6	38	2	28	28	16	6	4	0	0	0	4	2	0	0	0	0	0
1135	32	10	6	0	10	0	16	32	0	26	34	28	14	8	0	0	0	12	12	0	0	0	0	0
1140	22	10	0	0	6	0	20	6	6	46	26	12	4	0	4	0	8	0	14	0	0	0	0	0
1145	54	10	10	0	2	0	28	28	0	18	50	52	2	0	0	8	0	2	12	68	0	0	0	0
1150	30	14	2	0	0	0	12	12	0	4	32	46	0	12	12	4	0	20	10	72	0	0	0	0
1155	44	22	0	0	40	0	22	30	0	28	34	42	0	2	0	0	14	10	26	92	0	0	0	0
1200	24	18	10	0	8	0	6	12	4	42	16	52	8	0	0	0	0	4	28	216	0	0	0	0
1205	36	12	6	0	30	4	12	14	0	32	28	26	14	0	0	0	14	16	30	262	0	0	0	0
1210	46	2	8	0	22	4	40	10	12	18	22	34	10	14	4	6	0	10	12	308	0	0	0	0
1215	56	34	0	0	18	0	28	34	26	20	22	34	6	16	0	18	0	4	8	314	0	0	0	0
1220	16	18	0	0	16	0	12	24	4	44	20	6	16	10	2	10	8	8	36	326	0	0	0	0
1225	68	6	8	4	42	6	2	32	16	50	36	28	0	0	12	6	0	4	20	340	0	0	0	0
1230	38	16	12	16	12	10	4	18	2	28	34	28	0	2	4	4	14	2	82	378	0	0	0	0
1235	60	32	4	18	30	29	4	18	0	34	34	40	18	0	0	6	10	30	86	490	0	0	0	0
1240	22	22	8	4	14	8	6	6	0	26	36	28	14	0	0	0	0	100	164	712	0	0	0	0
1245	56	30	16	12	26	0	12	20	2	32	16	34	0	4	0	14	0	58	198	956	0	0	0	0
1250	16	18	0	32	0	4	2	18	6	32	24	4	14	6	6	0	0	46	232	1014	0	0	0	0
1255	42	34	2	6	8	4	6	48	12	24	26	32	22	10	16	20	4	16	244	1136	0	0	0	0
1300	40	16	6	0	6	2	22	20	18	26	24	20	52	0	6	38	12	18	272	1308	0	0	0	0
1305	26	26	0	6	18	2	14	26	20	42	26	20	38	10	6	38	0	2	286	1374	0	0	0	0
1310	10	6	8	0	6	6	26	20	0	88	12	16	52	0	2	48	12	14	268	1558	0	0	0	0
1315	40	8	4	4	20	4	6	46	0	84	22	6	22	0	0	18	0	4	264	1606	0	0	0	0
1320	20	20	6	0	4	0	14	40	4	68	14	14	8	0	0	0	2	0	248	1634	0	0	0	0
1325	16	6	20	12	6	2	48	40	6	100	16	20	0	10	0	0	0	14	222	1638	0	0	0	0
1330	32	6	4	2	4	2	70	22	18	116	34	16	8	6	0	10	12	0	198	1644	0	0	0	0
1335	16	32	6	0	2	0	56	10	4	102	28	36	4	0	10	28	10	12	196	1650	0	0	0	0
1340	10	4	6	0	10	0	70	2	0	96	10	6	2	22	4	18	0	14	166	1698	0	0	0	0
1345	8	14	2	0	12	0	56	0	6	78	12	6	0	0	22	40	4	8	152	1732	0	0	0	0
1350	2	16	0	4	14	0	80	0	6	64	10	8	0	0	8	18	0	0	106	1742	0	0	0	0
1355	6	12	0	0	24	0	86	10	0	88	10	6	0	0	0	10	0	0	60	1752	0	0	0	0
1400	12	10	0	0	14	0	54	6	4	116	0	4	0	0	2	12	0	0	6	1760	0	0	0	0

FIGURE 20. OCCUPANCY COUNTS AT LANDSIDE POINTS

TABLE 2. SUMMARY OF MODEL OUTPUTS

FACILITY	FLOW	QUEUEING TIME STATISTICS	OCCUPANCY	AVERAGE UTILIZATION	QUEUE SIZE
Inbound roadway	HSV				
Enplaning Curbside (Vehicles)	HSV, STO	STO	STO	STO	STO
Express Check-in Counters	HSV	QUE, F	PO	STO, F	QUE, F
Full Service Counters	MH	QUE, F	PO	STO, F	QUE, F
Security Checkpoints	MH	QUE		STO, F	QUE, F
Gate Counters/Seat Assignment	STO, F	QUE	PO	STO, F	QUE, F
Baggage Claim Areas		UC	PO		UC
Rental Car Counters	STO, F	QUE, F	PO	QUE, F	QUE, F
Deplaning Curbside (Vehicles)	HSV, STO	STO	STO	STO	STO
Parking Lots			HSV		
Parking Lot Exits	STO	QUE		STO	QUE
Outbound Roadway	HSV				
Recirculation Roadway	HSV				
Immigration Clearance	HSV, STO, F	QUE	PO	STO	QUE
Customs Clearance	HSV, STO, F	QUE	PO	STO	QUE
Corridors/Walkways	MH		PO		
Lobbies			PO		
Gates (Departure) Lounges			PO		

LEGEND HSV - GPSS Halfword Savevalue

MH - GPSS Halfword Matrix

STO - GPSS Storage

QUE - GPSS Queue

F - FORTRAN Formatted Summaries

PO - Point Occupancy Timeseries

UC - GPSS User Chains

Note: Utilization statistics invalidated if CHANGE data is applied to facility.

INBOUND ROADWAY - ARDXH
ENPLANING CURBSIDE - ENPXH
DEPLANING CURBSIDE - DEPXH
OUTBOUND ROADWAY - DRDXH
IMMIGRATION CLEARANCE - IMIG
CUSTOMS CLEARANCE - CSTM
RECIRCULATION ROADWAY - RERXH.

Matrices used as flow counters are the following:

MH11 - Persons proceeding from concourses into the lobby

MH12 - Persons proceeding from security toward gates

MH13 - Persons processed through airline full service ticket counters.

6.1 ALSIM MESSAGES

When conditions requiring warning or error messages are encountered, these are provided by GPSS or LINKC(FORTM) or ARGERR. GPSS error messages are listed in the GPSS-V Introductory User's Manual (SH20-0866-1) or GPSS-V User's Manual (SH20-0851-1) produced by IBM. Volume V, Appendix B: ALSIM Subroutines provides details of LINKC(FORTM) and ARGERR message statements.

7. PROGRAM MODIFICATIONS

ALSIM program modifications are accomplished by using the IBM utility program, IEBUPDTE by adding, deleting or replacing records in the program modules. Changes can be made to the following modules: auxiliary (AUX), GPSS main (MAIN) and LINKC(FORTM) section (FORT), individually or simultaneously in the same IEBUPDTE run. The following JCL is used:

```
//JBUPDT JOB (XXXX,D72,DESK),'MAHAJAN'CLASS=A,TIME=1,REGION=128K
//* THIS STEP UPDATES ONE OR MORE MODULES IN THE SOURCE LIBRARY
//UPDATE EXEC PGM=IEBUPDTE,PARM=MOD
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD DSNAME=P.TSC.ALSIM.SOURCE,DISP=SHR
//SYSUT2 DD DSNAME=P.TSC.ALSIM.SOURCE,DISP=SHR
//SYSIN DD *
./ CHANGE NAME=MAIN
         ----- U P D A T E   C A R D S   F O R   M A I N   P R O G ----
./ CHANGE NAME=FORT
         ----- U P D A T E   C A R D S   F O R   F O R T   P R O G ----
./ CHANGE NAME=AUX
         ----- U P D A T E   C A R D S   F O R    A U X   P R O G ----
/*
```

The option LIST=ALL may be used on the CHANGE cards in order to get a set of updated listings. In the absence of this option, only the listing of the changes, including all deletions and insertions, is produced.

7.1 PROGRAM UPDATE EXAMPLE

The following Job Control Language is an example of an actual update run. The file name, P.TSC.ALSIM.SOURCE, contains a member, MAIN, requiring updating. All the changes are placed after the CHANGE card. In this example, only one record is changed to 'SIMULATE 7'. The record sequence number is specified in Columns 73 to 80.

The sample JCL is shown as follows:

```
//RLSS2 JOB (xxxx,D72,DESK),'MAHAJAN',CLASS=A,MSGLEVEL=1,TIME=2,
//   REGION=400K
//UPDATE EXEC PGM=IEBUPDTE,PARM=MOD,ACCT=COST
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD DSNAME=P.TSC.ALSIM.SOURCE,DISP=OLD
//SYSUT2 DD DSNAME=P.TSC.ALSIM.SOURCE,DISP=OLD
//SYSIN DD *
./   CHANGE NAME=MAIN
       SIMULATE   7
/*                                                     0149000
```

7.2 LINKC(FORTM) COMPILE AND LINK EDIT STEP

As indicated in Section 3, the FORTRAN subprogram LINKC(FORTM) resides in the library P.TSC.ALSIM.SOURCE, with the number name FORT. After modifying the source code, the new version of this subprogram must be compiled and link edited with other ALSIM subroutines to provide a new version of the subroutine load module, P.TSC.ALSIM.LOAD. At execution of the GPSS AUX or MAIN programs, this dataset is concatenated with SYS1.GPSS5 under the STEPLIB DDNAME as explained in Section 4, Program Execution.

When the subprogram LINKC(FORTM) is link edited, the member name LINKC is identified and the alias name FORTM is also specified in the input data stream.

An example of the JCL used to perform the compilation of LINKC (FORTM) and subsequent link editing with other subroutines is shown below. Note that P.TSC.ALSIM.LOAD specified with the DDNAME SYSLIB is the outdated version of the subroutine load module. This version is concatenated with SYS1.FORTLIB and is used to produce the new version of the subroutine load module identified in the SYSLMOD statement.

```
//JCOMPL JOB (XXXX,D72,DESK),'MAHAJAN',CLASS=A,MSGLEVEL=1,TIME=4,
//   REGION=500K
//* FORTRAN G1 COMPILE-LINK EDIT STEP.. LOAD MODULES ARE PLACED
  IN THE
//* LOAD LIBRARY.
//FORT EXEC PGM=IGIFORT,ACCT=COST
//SYSPRINT DD SYSOUT=A
//SYSPUNCH DD DUMMY
//SYSLIN DD DSN=&DECKSET,DISP=(MOD,PASS),UNIT=SYSDA,
// SPACE=(TRK,(10,10)),DCB=(LRECL=80,BLKSIZE=3040,RECFM=FE)
//SYSIN DD DSD=P.TSC.ALSIM.SOURCE(FORT),DISP=SHR
//LINK EXEC PGM=IEWL,PARM=(LET,XREF,LIST),COND=(4,LT,FORT)
//SYSLIB DD DSN=SYS1.FORTLIB,DISP=SHR
//       DD DSN=P,TSC.ALSIM.LOAD,DISP=SHR
//SYSLMOD DD DSN=P.TSC.ALSIM.LOAD(LINKC),DISP=SHR
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD DSN=&TEMP1,UNIT=(SYSDA,SEP=(SYSLMOD)),SPACE=(1024,
  (50,20))
//SYSLIN DD DSN=&DECKSET,DISP=(OLD,DELETE)
//       DD *
 ALIAS FORTM
/*
```

After the compilation and link edit step, the subroutine load module contains the new version of LINKC, alias FORTM. An example of linkage editor output for this step is shown in Figure 21. After the compilation and link-edit step, the load library P.TSC. LOAD, updates the members LINKC and FORTM. These modules are loaded when the AUX OR MAIN programs of the model are run.

7.3 COMPRESSING DATASETS

After several updates have been made to the programs AUX, MAIN or FORT in the source library, the disk space available to the user generally becomes filled. This step releases the space used by previously edited members and places the current version of the members at the beginning of the allocated disk space. Sample JCL used to accomplish this is shown below:

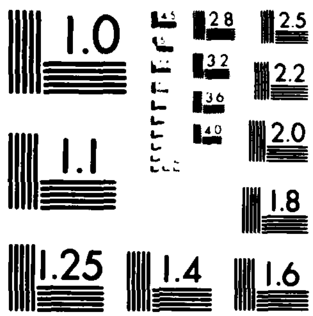
```
F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LET,XREF,LIST
         DEFAULT OPTION(S) USED -  SIZE=(196608,65536)
IEW0000      ALIAS FORTM                                                                 00000170
IEW0241   IBCOM#
IEW0241   FDIOCS#
IEW0241   INTSWTCH
IEW0241   SEQDASD
IEW0241   ERRMON
IEW0241   ERRTRA
****LINKC      NOW REPLACED IN DATA SET
****FORTM      IS AN ALIAS FOR THIS MEMBER
AUTHORIZATION CODE IS          0.


                                                    CROSS REFERENCE TABLE

  CONTROL SECTION                        ENTRY

   NAME      ORIGIN  LENGTH               NAME     LOCATION     NAME     LOCATION     NAME     LOCATION     NAME     LOCATION
  LINKC          00    EC1C
                                         FORTM           30
  ASSIGN  *    EC20     362
                                         PVAL          ED18     LOGIC        EE14
  CLINK2  *    EF88     13C
  IHONAMEL*    F0C8     C97
                                         FRDNL#        F0C8     FWRNL#       F7C4
  IAND    *    FD60      2E
  IHDECOMH*    FD90     EB0
                                         IBCOM#        FDBC     IB031971     FDBC     FDIOCS#      FE78     INTSWTCH     10878
  FIOAP#  *   10C40     6F4
                                         AP031971     110B4
  IHCCOMH2*   11338     9C5
                                         SEQDASD      116F2
  MHBASE  *   11D00     30C
                                         MHBASE       11D30     MLBASE      11D58
  SNLINK  *   12010      B4
  XCOLE#  *   12098      A8
                                         XCODE        12098
  IHCEFIOS*   12140     F28
                                         FIOCS#       12140     FIOCSBEP    12146
  IHCFIOS2*   13068     52E
  IHCECOMH*   13598     F61
  IHCFOMH2*   14500     65D
  IHCFCVTH*   14560    119D
                                         ADCON#       14B60     FCVAOUTP    14C0A     FCVLOUTP    14C9A     FCVZOUTP    14DEA
                                         FCVIOUTP     15198     FCVEOUTP    1569A     FCVCOUTP    158B4     INT6SWCH    15B98
  IHCEFNTH*   15D00     542
                                         ARITH#       15D00     ADJSWICH    1609C
  IHCERRM *   16248     5D4
                                         ERRMON       16248     IHCEHRE     16260
  IHCUATBL*   16920     638
  IHCUOPT *   1EE5L     300
  IHCETRCH*   17158     28E
```

FIGURE 21. LINKC(FORTM) LINKAGE EDITOR OUTPUT

AD-A117 600 TRANSPORTATION SYSTEMS CENTER CAMBRIDGE MA F/G 1/5
AIRPORT LANDSIDE. VOLUME II. THE AIRPORT LANDSIDE SIMULATION MO--ETC(U)
JUN 82 L MCCABE, M GORSTEIN
UNCLASSIFIED DOT-TSC-FAA-82-4-2 FAA-EM-80-8-2 NL

2 of 2

END
DATE FILMED
8 82
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

NAME	ORIGIN	LENGTH	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
			IHCTRCH	17158	ERRTRA	17160				
ARGERR *	173E8	348								
IHOERRM *	17730	624								
			IHOERRE	17748						
IHOUOPT *	17D58	338								
IHOSSQRT*	18090	168								
			SQRT	18090	IH$SQRT	18090				
IHOETRCH*	181F8	2AE								
			IHOTRCH	181F8						

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION	LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
DA0	IBCOM#	IHOECOMH	DA4	IAND	IAND
DA8	XCODE	XCODE#	DAC	FRDNL#	IHONAMEL
DB0	MNLINK	MNLINK	DB4	CLINK2	CLINK2
DB8	MHBASE	MHBASE	DBC	MLBASE	MHBASE
DC0	ASSIGN	ASSIGN	DC4	PVAL	ASSIGN
DC8	LOGIC	ASSIGN	DCC	SQRT	IHOSSQRT
EF6C	ARGERR	ARGERR	F0BC	LINKC	LINKC
F0C0	IBCOM#	IHOECOMH	FB18	IBCOM#	IHOECOMH
FB20	ADCON#	IHCFCVTH	FB1C	FIOCS#	IHCEFIOS
FC1C	IHOERRM	IHOERRM	FE78	SEQDASD	IHOCOMH2
FED0	IHOCOMH2	IHOCOMH2	10A7C	ADCON#	IHCFCVTH
10A74	FIOCS#	IHCEFIOS	10A80	ARITH#	IHCEFNTH
10A9C	ADJSWTCH	IHCEFNTH	10A50	IHOUOPT	IHOUOPT
10B94	IHOCMSE	$UNRESOLVED(W)	10A84	FCVEOUTP	IHCFCVTH
10A88	FCVLOUTP	IHCFCVTH	10A8C	FCVIOUTP	IHCFCVTH
10A90	FCVCOUTP	IHCFCVTH	10A94	FCVAOUTP	IHCFCVTH
10A98	FCVZOUTP	IHCFCVTH	10B7C	IHOASYNC	$UNRESOLVED(W)
109D4	IHOERRM	IHOERRM	10A28	IHOERRE	IHOERRM
10A58	IHOCOMH2	IHOCOMH2	10BD4	FIOAP#	FIOAP#
10C38	FIOAP#	FIOAP#	10C3C	FIOAP#	FIOAP#
10A2C	IHOCOMH2	IHOCOMH2	10A30	IHOCOMH2	IHOCOMH2
10A34	IHOCOMH2	IHOCOMH2	10A38	IHOCOMH2	IHOCOMH2
110CC	IBCOM#	IHOECOMH	11164	IHOCOMH2	IHOCOMH2
114A5	IHOECOMH	IHOECOMH	11570	IHOECOMH	IHOECOMH
11B5D	IHOECOMH	IHOECOMH	11B6D	IHOECOMH	IHOECOMH
11B7D	IHOECOMH	IHOECOMH	12138	IBCOM#	IHOECOMH
1213C	FIOCS#	IHCEFIOS	122A8	IHCERRM	IHCERRM
122AC	IHCFIOS2	IHCFIOS2	12EB8	IHCUATBL	IHCUATBL
12EC4	IBCOM#	IHOECOMH	12ED9	IHCFIOS2	IHCFIOS2
12EF0	IHCFIOS2	IHCFIOS2	13061	IHCFIOS2	IHCFIOS2
13654	SEQDASD	IHOCOMH2	143E4	ADCON#	IHCFCVTH
143DC	FIOCS#	IHCEFIOS	143E8	ARITH#	IHCEFNTH
14408	ADJSWTCH	IHCEFNTH	14404	IHCUOPT	IHCUOPT
143EC	FCVEOUTP	IHCFCVTH	143F0	FCVLOUTP	IHCFCVTH
143F4	FCVIOUTP	IHCFCVTH	143F8	FCVCOUTP	IHCFCVTH
143FC	FCVAOUTP	IHCFCVTH	14400	FCVZOUTP	IHCFCVTH
14390	IHCERRE	IHCERRM	143BC	IHCCOMH2	IHCCOMH2
143C0	IHCERRM	IHCERRM	14394	IHCCOMH2	IHCCOMH2
14398	IHCCOMH2	IHCCOMH2	1439C	IHCCOMH2	IHCCOMH2

FIGURE 21. LINKC(FORTM) LINKAGE EDITOR OUTPUT (CONTINUED)

LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION	LOCATION	REFERS TO SYMBOL	IN CONTROL SECTION
143A0	IHCCOMH2	IHCCOMH2	1479D	IHCECOMH	IHCECOMH
147A0	IHCECOMH	IHCECOMH	14548	IHCERRM	IHCERRM
14544	IBCOM#	IHOECOMH	1498D	IHCECOMH	IHCECOMH
149CD	IHCECOMH	IHCECOMH	149DD	IHCECOMH	IHCECOMH
15B5C	IBCOM#	IHOECOMH	15858	IHCERRM	IHCERRM
160EC	IBCOM#	IHOECOMH	160F0	INTSWTCH	IHOECOMH
16098	INTSWCH	IHCFCVTH	16094	IHCUOPT	IHCUOPT
160F8	ADCON#	IHCFCVTH	160F4	FIOCS#	IHCEFIOS
16164	IHCERRM	IHCERRM	1680C	IHCUOPT	IHCUOPT
16610	IBCOM#	IHOECOMH	16914	IHCTRCH	IHCETRCH
16618	FIOCSBEP	IHCEFIOS	172CC	IBCOM#	IHOECOMH
172D0	ADCON#	IHCFCVTH	172D4	FIOCSBEP	IHCEFIOS
174A0	IBCOM#	IHOECOMH	17D44	IHOUOPT	IHOUOPT
17D48	IBCOM#	IHOECOMH	17D4C	IHOTRCH	IHOETRCH
17D50	FIOCSBEP	IHCEFIOS	18174	IBCOM#	IHOECOMH
1819C	IHOERRM	IHOERRM	18390	LDFIO#	$UNRESOLVED(W)
18388	IBCOM#	IHOECOMH	1838C	ADCON#	IHCFCVTH
18394	FIOCSBEP	IHCEFIOS			

ENTRY ADDRESS 00

TOTAL LENGTH 184A8

DIAGNOSTIC MESSAGE DIRECTORY

IEW0241 WARNING - EXTERNAL SYMBOL PRINTED IS DOUBLY DEFINED -- ESD TYPE DEFINITIONS CONFLICT.

FIGURE 21. LINKC(FORTM) LINKAGE EDITOR OUTPUT (CONTINUED)

```
//JBCOMP JOB (XXXX,D72,DESK),'MAHAJAN'CLASS=A,TIME=1,REGION=128K
//* THIS STEP COMPRESSES A SOURCE LIBRARY.  THIS IS NEEDED AFTER
//* SEVERAL UPDATES ARE MADE TO PROGRAMS IN THE SOURCE LIBRARY.
//JOBSTEP  EXEC  PGM=IEBCOPY
//SYSPRINT  DD  SYSOUT=A
//INOUT1  DD   DSN=P.TSC.ALSIM.SOURCE, DISP=SHR
//SYSUT3  DD   UNIT=SYSDA,SPACE=(TRK,(1))
//SYSUT4  DD   UNIT-SYSDA,SPACE=(TRK,(1))
//SYSIN  DD  *
COPYOPER  COPY  OUTDD=INOUT1,INDD=INOUT1
/*
//* THIS STEP COMPRESSES A LOAD LIBRARY.  THIS IS NEEDED AFTER
//* SEVERAL UPDATES ARE MADE TO PROGRAMS IN THE CORRESPONDING
//* SOURCE LIBRARY.
//JOBSTEP  EXEC  PGM=IEBCOPY
//SYSPRING  DD  SYSOUT=A
//INOUT1  DD  DSN=P,TSC. ALSIM.LOAD, DISP=SHR
//SYSUT3  DD  UNIT=SYSDA,SPACE=(TRK,(1))
//SYSUT4  DD  UNIT=SYSDA,SPACE=(TRK,(1))
//SYSIN  DD *
COPYOPER  COPY  OUTDD=INOUT1,INDD=INOUT1
/*
```

DATE
FILMED
8-8